RAILROAD GAZETTE

FRIDAY, OCTOBER 28.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Eastern Illinois & Indiana State Line; Momence & State Line; Northern Pacific.

Elections.—Cincinnati, Indianapolis & St. Louis, E. F. Osborne, Vice-President.—Paintsville & Licking Valley, John F. Hazar, President.—South Atlantic & Ohio, H. W. Bates, General Manager.—Texas, Sabine Valley & Northwestern, M. S. Easton, President.

New Companies Organized.—Chicago Transfer is incorporated in Illinois.—Ore Belt is incorporated in Georgia.—Paintsville & Licking Valley is organized in Kentucky.—Squirrel Hill is granted a charter in Pennsylvania.—Vancouver, Klickitat & Yakima is incorporated in Washington Territory.

Changes and Extensions.—*Alabama:* Mobile & Birmingham is built for 50 miles from Marion Junction.—*Arizona:* Maricopa & Phœnix will be extended to Globe.—*California:* Atlantic & Pacific is surveying extension from Rogers' Station to Tejon Pass. Los Angeles County road begins work. Salt Lake & Los Angeles is making surveys.—*Dakota:* St. Paul, Minneapolis & Manitoba is extended to Langdon.—*Indiana:* Chicago & Indiana Coal road will build branch.—Lake Shore & Michigan Southern is surveying from South Bend to Baileytown. *Michigan:* Milwaukee & Northern is extended to Republic.—*Tennessee:* Knoxville Belt has completed survey.—*Virginia:* Roanoke & Tar River is extended to Beverly, N. C.

Traffic.—Anthracite coal shipments for the week ending Oct. 22 show an increase of 26.9 per cent., as compared with the same period last year: bituminous shipments show an increase of 6.8 per cent. Cotton receipts, interior markets, for the week ending Oct. 21 show an increase of 6.6 per cent., as compared with the corresponding week last year; shipments show an increase of 2.5 per cent.; seaport receipts show an increase of 1.8 per cent.; exports an increase of 12.9 per cent.; cotton in sight is greater than at the same date last year by 9.5 per cent.

Earnings.—Gross earnings for the month of August are reported by 16 roads; 12 report an increase and 4 a decrease; the total net increase is $123,794, or 3.4 per cent. For the 8 months ending Aug. 31, 13 roads report gross earnings, 10 showing an increase and 3 a decrease; the total net increase is $2,874,599, or 12.4 per cent. Nor the 9 months, ending Sept. 30, gross earnings are reported by 45 roads, none of which report a decrease. The total increase is $7,895,974, or 15.5 per cent.

Contributions.

The Railroad Jubilee Exposition.

PARIS, Oct. 12, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The "Exposition du Cinquantenaire des Chemins de Fer" (Railroad Jubilee Exposition), at which I was to represent the —— Manufacturing Company, has been such an absolute failure and unmitigated swindle that I removed the machines to the Conservatoire des Arts et Métiers (Museum for the Arts and Trades) in Paris as long ago as July. There was absolutely nothing there that was new or of sufficient interest for your paper, and I therefore sent you no letters. Certainly not 75 technical exhibits were in the entire exposition. The government had withdrawn its patronage before the date fixed for its opening. The other patrons had done likewise, and the General Manager of the Executive Committee, whose name is Montaut, ex-Chief Engineer of the Ponts et Chaussées and now member of the French Chamber of Deputies, quietly left his office and post without notifying either the Municipal Council of Paris or the Foreign Commissioners of the Exposition. At the head of the management remained one "De Sarcieu," but whose real name is Nublat, which he cannot retain as he is "wanted" for previous swindling.

The exposition was bankrupt before the day set for its opening, but all this information was carefully kept from all interested parties until it was gradually evolved by the united efforts of a number of foreigners working together.

The machinery was never put in motion, and the boilers were fired exactly seven times, and then only to light by electricity in the evening for a few hours. The whole affair indeed was such an outrageous swindle that neither engineers nor manufacturers would take the trouble to visit it, and, in fact, only the rabble spent their leisure days at a resort, which, in fact, was nothing but a collection of drink-shops and restaurants.

Nothing so disgraceful as this has happened anywhere in the way of an exposition, which was heralded as was the Jubilee Railroad Exposition. It was supported solely by a lot of "knights of industry," who have now turned their attention to the exposition of 1889, also apparently patronized by the government, but the main responsibility rests upon these same enterprising speculators, constituting a corporation. As you know, not one foreign government has accepted the invitation to participate, and it is doubtful whether this will not be another great swindle. The Board of Managers are continually squabbling among themselves, and as all the works are in a very backward state there is great probability that there will be considerable delay in its inauguration, if that day *ever* arrives. It is only supported by the government to give support to numbers of poor without work, but as it has not interested itself financially to any great extent, it can withdraw its support at any time should it happen that matters do not move to its satisfaction. All of the brilliant reports of the rapid progress made are mere fabrication published for effect. It is however true that the "Eiffe. Tower" of 300 metres is progressing rapidly, as this is an undertaking by contract under guarantee to insure the constructors against loss. The other structures, however, are progressing very slowly, and there is hardly any probability of their being finished in time.

It would be a pity if Americans should come here on the strength of representations made at this time, and I ask you to give this as much publicity as possible through your paper.

H.

The Annual Inspection of the Boston & Albany—The Dynagraph.

BOSTON, Oct. 22, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The annual inspection of the Boston & Albany has just been completed. Besides the usual careful examination of the alignment and surface of the track, the frogs, switches, bridges, buildings, etc., a set of diagrams of the whole track (with the exception of a few of the shorter branches) has been made by Mr. P. H. Dudley with his dynagraph car. This dynagraph, or track inspection car, is briefly described as follows: One end of a car about 50 ft. long is supported by what bears some resemblance to an ordinary six-wheeled truck, but a very cursory examination shows important points of difference. The weight of this end of the car (which is 17 tons) is evenly divided among the three sets of wheels. The middle pair besides carrying their proportion of the weight, are also for the purpose of marking the low points of the track and making a diagram of the surface of the rails. In addition to the frame carrying the weight of the car, the end wheels support a light frame, to which are attached adjustable marking devices. These are so arranged in connection with the middle pair of wheels that any depression of these wheels beyond a certain definite amount, for which the markers have previously been adjusted, causes a spot of blue paint to be thrown on the side of the rail at this point. These spots of paint will remain visible for several weeks, or even months, if there be no heavy storms. The wheel base of the truck is 11 ft., and the limit of marking may be anything we please. So sensitive is the adjustment of this part of the apparatus that a difference of less than one sixty-fourth of an inch will determine whether a point will be marked or not. The middle wheels follow every undulation of the track, and, by means of small levers attached to them, reproduce these undulations upon a roll of paper in the car. Directly over the truck is placed an iron table with a convex surface, over which is drawn a broad strip of paper, at a constant speed, by means of a worm gear connected with one of the axles. This was illustrated in the *Railroad Gazette*, Sept. 19, 1879. On this paper are drawn 18 different curves relating to the condition of the track. The horizontal scale of these is 50 ft. to the inch. This is sufficiently large to allow the surface of each rail to be studied by itself. The first two curves represent the surface of the two rails and the next two sum up all the vertical undulations, whether marked or not, and record their amount on the diagram, in feet and inches, for each rail. Other curves show the vertical and side shocks received by the car (which are, of course, dependent on the roughness of the track), the proportions of straight line and curve, the elevation of the outer rail on curves, the distance run by the car and the time for every second and every tenth second. By means of telegraphic keys within easy reach, the positions of stations, mile-posts, bridges and other points may be recorded; and lastly, two curves show in full size the variations of the gauge of the track. This is done by means of a small pair of disks which run between the rails and by springs which keep them pressed against the rails are caused to follow all the inequalities of gauge and by lever attachments to record them in their proper places on the paper. For the most of these curves there is also drawn a series of reference lines for the purpose of comparison. The curves showing the surface and gauge of the rails are the most important and instructive; and so accurate are they that they will instantly show any change in the character of the surface, and Mr. Dudley has often when running over new track been able to distinguish different brands of rails from each other by the difference in their diagrams. He has observed that new rails as they come from the mill often have long bends which would not be detected by the eye, but which have an important bearing on the life of the rail in the track.

The first systematic marking of a railroad track was done on the Boston & Albany in 1883, since which time it has been regularly marked several times each year. In the first instance the markers were set to mark depressions of more than one-fourth of an inch. The Eastern, Maine Central, New York Central and Lake Shore were also marked in 1883, the last two at five-sixteenths of an inch. The marks show trackmen where surfacing needs to be done. As these roads improved, the marking was done at smaller limits, until for the last two years the Boston & Albany has been marked at three thirty-seconds of an inch. Judging from present experience this is about the limit to which trackmen can bring the surface of ordinary rails on a gravel ballast. New 72-lb. rails in good surface could be marked a trifle finer, say as low as one-sixteenth of an inch, and the deflections could be kept within this amount by the trackmen. At these low deflections every place where the rails are loose on the ties is marked, as well as all other irregularities. Some of these the trackmen may not be able to improve, but every place marked by the car denotes some imperfection, and many of these can be wholly or partially removed by trackmen knowing where they are. Since 1883, many bends in the rails of the Boston & Albany track have been taken out by persistent effort, and experience has shown that to bring a railroad track into the best condition is not the work of a few days or weeks, but requires years of labor.

A small sum spent in diagrams a few times a year will be many times refunded (if followed up by careful work by the trackmen) in the decreased power required to haul freight and the wear and tear of rolling stock.

The dynagraph car is kept when not in use at the yard of the Grand Central Depot in New York, where the readers of the *Railroad Gazette* will certainly be pleasantly entertained by Mr. Dudley's explanation of the car and its work. Mr. Dudley is assisted in his work by his accomplished wife, who keeps his books, records his notes, etc. She always accompanies him on his inspections and knows almost as much about the different railroads of the country as her husband.

GEO. W. BLODGETT.

Counterbalancing of Locomotives.

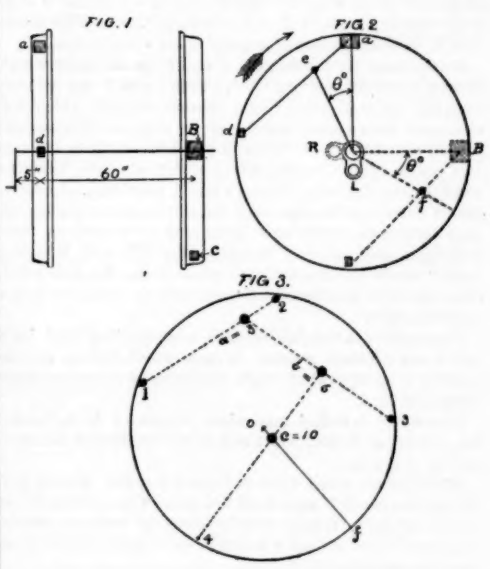
NEW YORK, Oct. 21, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In regard to the contribution of Mr. Vielhaber in the *Railroad Gazette* of the 14th, it would be well had he pointed out that whatever proportion of the reciprocating weights be balanced, the counter weights should not be placed directly opposite the crank pins. This is as true of outside as of inside connected engines.

The moving gear of the engine revolves in one plane and the counterweights revolve in another plane some inches within the plane of revolution of the moving parts. Now, the true art of balancing or the true theory of it lies in preserving the C. G. (centre of gravity) of the whole machine in one fixed position. So long as the reciprocating weights are balanced by revolving weights we know that it is quite impossible to preserve a steady C. G., but there is no reason (beyond the irregularity of the connecting rod) why no movement of the C. G. should take place, excepting in the vertical plane alone which gives rise to the so-called hammer blow.

In diagram, fig. 1, we have the piston and other portions of the gear "revolving" in a plane distant 5 in. from the plane



of revolution of the counterweights. As the to and fro movement of any weight tends to twist the whole machine upon an axis which passes vertically through the point of contact of the opposite wheel with the rail, it appears that the piston and its appendages have a lever arm of 65 in., while that of the counterweight is only 60 in. To increase the moment of the counterweight, its weight must be increased to $1\frac{5}{60}$ of what theory would apparently indicate. We have then a system of levers in which the axle is the lever and weights are hung at the extremity and at 5 in. therefrom of 60 and 65 units respectively. But in thus altering the weight of the main counterbalance a, though we may have improved the twisting action we have vitiated the steadiness of the C. G. of the whole engine, which will now have a longitudinal movement. To remedy this a small balance weight C must be introduced in the opposite wheel. We have now reduced our combination to the form of a 65-in. lever at each end, of which weight L and c, of 60 and 5 units respectively, are suspended, and the lever is hung at 5 in. from the end L, and the weight at the point of suspension is, of course, the sum of L and c, or 65 units, *i. e.*, the weight of the balance a. Taking out the moments of each weight we have $L \times 5$ in. $= 60 \times 5$ in. $= 300$, and $c \times 60$ in. $= 5 \times 60$ in. $= 300$, and $L + c = a$. We thus may lay down as a rule that when we have decided upon the

Fig. 1.

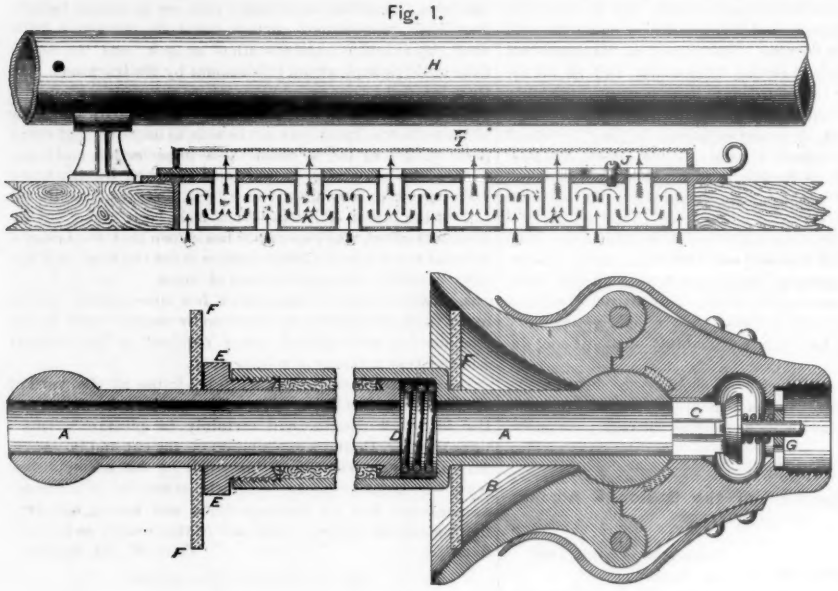


Fig. 2.

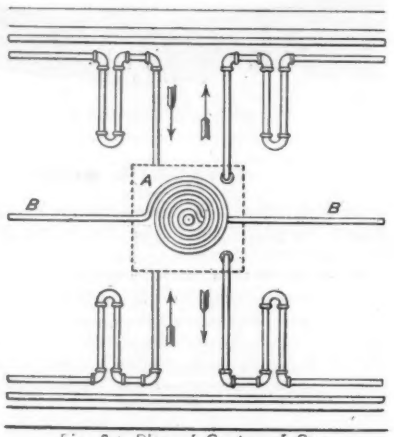


Fig. 3.—Plan of Centre of Car.

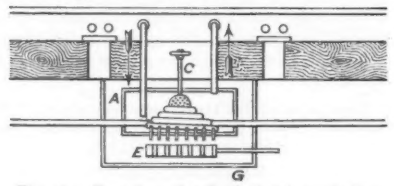


Fig. 4.—Part Longitudinal Section of Car.

THE PENNYCUICK SYSTEM OF HEATING AND VENTILATING CARS.

total proportion of the weights to be taken for balancing, there must be a balance weight placed in each wheel; that in the near wheel to be opposite the crank and that in the far wheel on the same side as the crank. The ratio between the far or small balance and the load to be balanced is to be inversely as their distances from the plane of revolution of the main balance. The main balance to be made equal to the sum of the weights to be balanced and the secondary weight *c*.

Hence in each wheel on an axle there are required two weights, one for its own side and the other as secondary balance for the opposite side of the engine.

Diagram, fig. 2, shows that for crank *L* there is a load *a* in its own or near wheel and a load *c* in the far wheel, while for crank *R* is a weight *B* as main balance in its own wheel and a weight *d* as secondary balance in the far wheel.

There is no necessity, however, in practice for employing double weights, as an equivalent single counterweight may be found as follows: For the left wheel join the centres of gravity of the weights *a* and *d*, and divide the line *a d* at *e* so that *a e*: weight *d* : : *d e*: weight *a*, or in other words find the common centre of gravity of the weights *a* and *d*.

Do the same for the weights *c* and *B* in the other wheel, finding *f* as their common C. G. Then *e* and *f* are the positions for the equivalent single balance weights which will eliminate the twisting spoken of in your short comment; *e* and *f* are of course to be made equal in weight to the sum of *a* + *d* and *B* + *C* respectively, but may, of course, be placed anywhere on the radii through *e* and *f*, providing, of course, that if moved out further they be correspondingly reduced. Any number of revolving weights may be treated on these principles, and, properly speaking, the side rods (coupling rods) "revolving" in a different plane from the piston rod, etc., require to be treated independently in order to insure correct results.

The result of a number of such computations may be a half dozen different weights in each wheel, but all may be reduced to an equivalent single weight by an extension of the method of fig. 2.

Thus in fig. 3, to find equivalent weight of 1, 2, 3 and 4 lbs., placed as shown, join 1 and 2; the result is 3 lbs. at *a*, and $1a = 2\ (a2)$.

Next join *a*3, result 6 lbs. at *b* and $a\ b = b3$. Finally join *b*4, and the result is seen in 10 lbs. at *c*. The combination of 1, 2, 3 and 4 lbs. is thus very little out of balance, and the single equivalent weight *c* would be quite small if moved out along its radial line *O f*.

To return to fig. 2 it is observable that in neither wheel is the counterbalance now opposite the crank pin, but assuming rotation as shown by the arrow, the weight is θ degrees behind the crank *L* produced, *while the opposite wheel* equivalent balance *f* is θ degrees *in front* of crank *R* produced.

This fact does not lead to any inconvenient practical results, for if a pair of wheels and axle be reversed end for end in the engine the weights will still be found leading and following their cranks as they should. The use of counterbalancers placed opposite the cranks is only a coarse approximation to the truth, for the angle θ degrees may be as much at 20 degrees, especially when heavy side rods are used on long wrist pins.

Other points in relation to this subject will be considered in a future letter. WILLIAM H. BOOTH.

The Pennycuick System of Heating and Ventilating Cars.

The accompanying illustrations represent a method of heating and ventilating cars devised by Mr. J. G. Pennycuick, of Boston, Mass., and described by him at the recent meeting of the New York Railroad Club.

The heating apparatus is shown in figs. 3 and 4, which represent plan and longitudinal section of the centre of the floor of the car. The hot water pipes in the car are arranged under the seats in the ordinary manner, and the circulation is shown by arrows. A steam pipe *B B*, running the length of the train, is formed into a spiral coil in the box *A*. At the apex of this spiral coil is a rose jet, which can be regulated by a handle *C*, fig. 4. A certain amount of steam can thus be injected into the water, heating it and causing circulation.

When the car is detached from the engine the water in the circulating pipes can be heated by means of a burner *E* placed under the box *A*, in which the circulating pipes terminate. This box is, of course, always full of water, which, when heated, will start a circulation. The box *A* is surrounded by an outer casing *b*. In order to conduct the heat more readily from the burner *E* to the water in the vessel *A*, the bottom of the latter is furnished with metal conducting points, as will be seen by a reference to fig. 4.

It will be noticed that the temperature of the car can be regulated from the inside of the car by the valve *C*, which controls the amount of steam injected into the water in the circulating pipes.

The system can with little modification be applied to any existing system in which hot water pipes are heated by a stove or furnace in or under the car. The circulating pipes are preferably arranged to rise gradually from the centre of the car, permitting the cold water to return by gravitation. At the end of the car, where the circulating pipes attain their highest point, is placed a supply cistern, which is open at the top, so that the water can never attain any greater pressure than that due to a few feet head of water.

The automatic coupling between the cars is shown in fig. 2. It is constructed on the principle of the sliding ball and socket joint formerly used between engine and tender before the introduction of hose. The trumpet-shaped mouth, which receives the globular end of the coupling pin *A*, is segmental, and the segments are closed by springs as shown. The packing inserted in the fixed portion of the coupler makes a tight joint with the ball on the coupling pin *A*.

The sliding joint is also packed as shown, the packing being tightened by a spiral spring *D*.

When the coupling pin *A* is withdrawn in uncoupling a car, the segments *B* close, and the valve *C* is seated by a spiral spring as shown.

The rubber washer *F* prevents the entrance of dust and ashes when the car is running.

The ventilating arrangement is shown in Fig. 1, which is a section of part of the floor of a car. The air enters a box inserted in the floor of the car, and passes into the car as shown by arrows. The box can be readily removed for cleaning, and the amount of air admitted into the car can be regulated by a slide. The air passes through a wire gauze screen *I*, placed over the top of the box, and then impinges on the hot water pipe *H*. It will thus be seen that the admission of external air can be regulated, and that the air is warmed immediately after admission. It is intended to place one of these ventilating boxes underneath each seat, so that the fresh air can be equally distributed over all parts of the car. It is claimed that the divisions in the box effectually prevent the wind or speed of the train having any effect upon the quantity of air admitted.

The Railroads of the Argentine Republic.

Harper's Monthly, in its interesting series of articles on our South American neighbors, prints in the current number one of great interest on what we have been accustomed to call the Argentine Confederation. It seems, however, this is a thing of the past, as is also the Patagonia of the school geographies, which has been divided between the Argentine Republic and Chili. The railroad development of the former is of peculiar interest.

Where the rivers do not run, the government is building railroads, and on the 1st of January, 1887, there were 4,200 miles under operation, with contracts for an extension of the system amounting to nearly $50,000,000. All of the roads are either owned by the government or subsidized by it. The common method is for Congress to give a tract of land as a gratuity, and guarantee interest to the amount of four or five per cent. upon the actual amount of money invested in construction. It is a singular fact that the government has never been called upon to make good any of the several railroad guarantees. It is claimed that the capital invested in railroads in the Argentine Republic gives a larger return than in any other country, the dividends for the entire system averaging over six per cent. Nearly all the capital is English, while most of the employés are Irish or Scotchmen. Baldwin locomotives and Pullman cars are generally used, and constitute, with agricultural machinery, the bulk of the imports from this country. There are very few people in the United States who are aware that Pullman sleeping cars are running across the pampas from the Atlantic Ocean to the foot-hills of the Andes, and it will be a surprise when I say that within a year or two those who desire to cross the southern continent from ocean to ocean may have a choice of railroad routes. One line, now completed with the exception of a hundred miles or so, runs almost directly from Buenos Ayres to Valparaiso, Chili. The other is to connect the port of Babia Blanca, 200 miles south of Buenos Ayres, with the coal fields at Conception and Talcahuano, on the Pacific coast. These roads will save commerce 5,000 miles of ocean navigation around by the Strait, and revolutionize the trade of the continent.

But an enterprise of still greater magnitude and importance to the world at large is the railroad that is being pushed into the heart of the continent northward from Buenos Ayres. Let whoever is interested in the subject take a map and trace a line northward through Sante Fe and Santiago to Tucuman, where the railroad now extends; then to Jujuy, to which point it is under construction; thence northward to Potosi and the Lake of Titicaca, on whose islands the empire of the Incas was born. There is a railroad now from the Pacific Coast to Lake Titicaca, operated by a Mr. Thorndyck, of Boston, and all the produce of Bolivia reaches market by that route; but having once reached the Pacific, it must be transported through the Strait or around the Horn, or by the Isthmus, which route shippers avoid.

Bolivia is doubtless the richest in minerals of any land on the globe, and millions upon millions of precious metals have been taken out of her mines by the primitive process which still exists, and must exist till railroads are constructed to carry machinery there. Every ounce of ore that finds its way out of the Andes is carried on the back of a man or a llama, and the quartz is crushed by rolling heavy logs upon it. By this method Bolivia exports from 12 to 15 millions of gold and silver annually, and the output would be fabulous if modern machinery could be taken into the mines.

It is expected that the railroad to the northern boundary of the Argentine Republic will be completed by the end of the present year, and the shippers on the Pacific coast will not have to wait much longer till two lines of track are open to the Atlantic. Then Buenos Ayres will be the London, the New York, of South America, the entrepot of the south half of the continent.

From the herds Mr. Halsey imported have sprung the millions of sheep that now graze upon the pampas, and single ranches exist there which for the area inclosed by wire fences and for the number of cattle branded are larger than four of the largest in the United States combined. As in this country, the cattle business is becoming monopolized by vast corporations. Rich Englishmen and Scotchmen and Irishmen are combining their interests, leasing or buying empires of territory and stocking it with the best breeds. Companies with five million dollars capital are common, and those with ten millions are not rare. The governments of Argentine and Uruguay subsidize the business of exporting frozen meat, and the Germans as well as the English and Scotch are taking advantage of the liberal concessions. The governments will guarantee dividends of 5 per cent. per annum upon an investment of five hundred thousand dollars or more, provided the annual exports amount to twenty thousand carcasses of beef for every one hundred thousand dollars invested.

The London and River Plate Frozen Meat Co. is becoming as great a commercial octupus as the Standard Oil Co., and is now shipping 7,000 carcasses a week to England on refrigerator ships constructed for the purpose. Until within a few years the chief source of wealth was cattle and sheep. In 1885 there were 41,000,000 sheep in the United States, 72,000,000 in Australia, and 100,000,000 in the Argentine Republic. We have two-thirds of a sheep to every inhabitant; in the Argentine Republic there are 25 sheep, and in Uruguay 40 sheep, to every man, woman and child. We have 40,000,000 of horned cattle to a population of 60,000,000; the Argentine Republic and Uruguay have 38,000,000 of cattle to a population of 4,500,000. In Uruguay, with a population of 500,000 souls, there are 8,000,000 of cattle, 20,000,000 of sheep, 2,000,000 of horses, or 60 head of stock for each man, woman and child. Fifteen million dollars has been invested in wire fences in Uruguay alone, and more than twice as much in the Argentine Republic. It is said to cost $50 to place a carcass of Chicago dressed beef

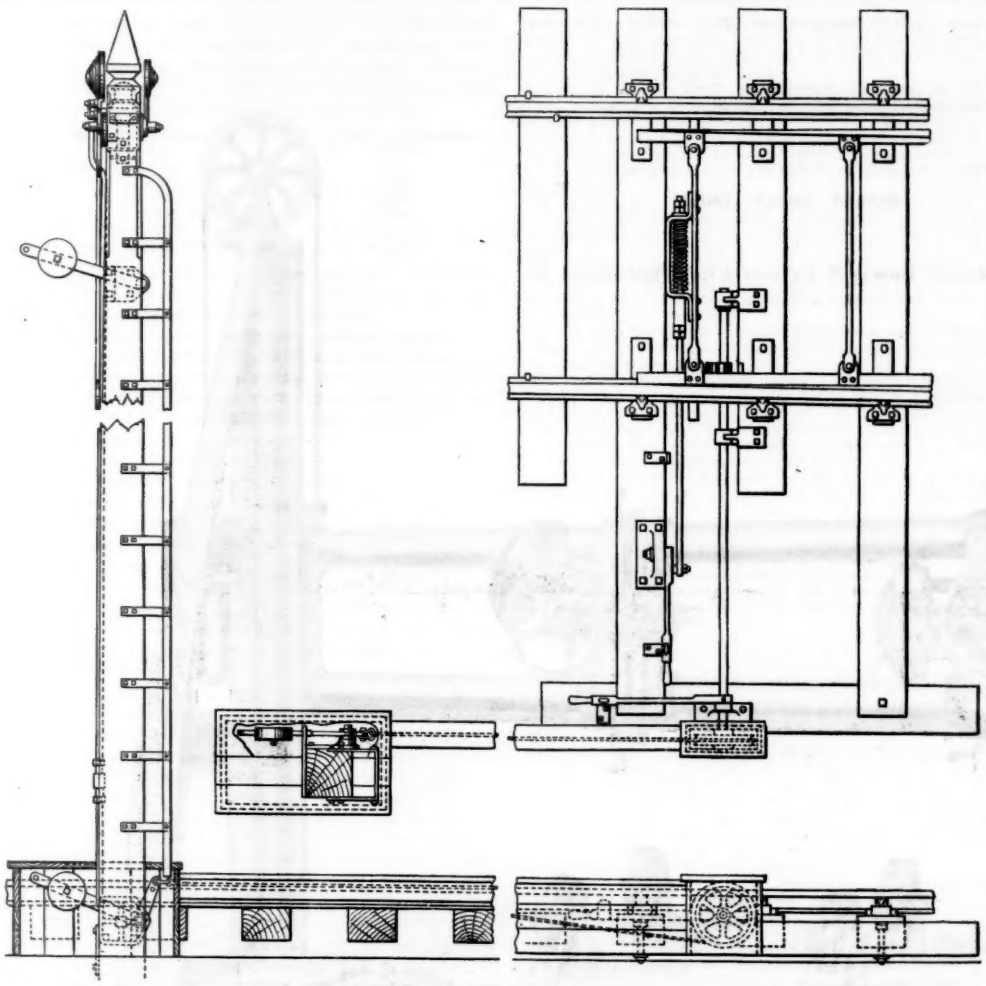


Fig. 1.

INTERLOCKED DISTANT SEMAPHORE SIGNAL FOR FACING POINT SWITCHES, PENNSYLVANIA RAILROAD.

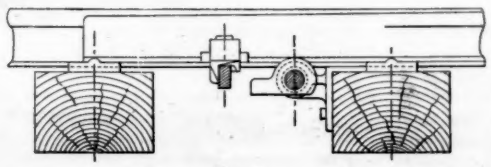


Fig. 2.

in the markets of London, and but half that sum from Argentine ports.

During the last 25 years the population of the Argentine Republic has increased 154 per cent., while that of the United States has increased but 79 per cent., and the city of Buenos Ayres is growing faster than Minneapolis or Denver.

The results of beneficent laws are conspicuous. In 1886 nearly 900,000 acres of wild land were ploughed and planted. One firm in Buenos Ayres sold 1,200 reapers manufactured in the United States, and other firms a lesser number; elevators are being erected upon the banks of the rivers, from which wheat is loaded into vessels for Brazil and Europe, and the average crop was 22 bushels of wheat to the acre.

Pennsylvania Distant Switch Signal.

The Pennsylvania Railroad, which, as is well known, has for a long time pursued the policy of protecting its dangerous switches by some form of warning other than the common target and light, has adopted a standard distant semaphore signal, which is being used for all new work and is gradually replacing other styles. The engravings herewith show the essential features of the apparatus. It is used only for facing point (split) switches, trailing points being provided with nothing but a lever. The illustrations are so clear that little description is needed. The height of the post and its distance from the switch vary with the locality. It will be seen that the interlocking is effected by a simple cam-shaped projection fixed to the shaft carrying the lever by which the signal is pulled to the "all clear" position. This cam is shown in fig. 2. When the switch rail is in position for the side track, it is directly over the cam, and thus makes it impossible to turn the wheel which pulls the wire to put the signal to safety.

The New York Railroad Club.—The Heating and Ventilation of Cars.

The usual monthly meeting of this club took place on the 20th inst., at 113 Liberty street, Mr. C. E. Garey, the president, in the chair. It was resolved that the name of the club should be changed from the Master Car-Builders' Club to the New York Railroad Club. There was a full attendance of gentlemen interested in the heating and lighting of cars.

Mr. W. G. CHASE showed a reducing valve made by the Mason Regulator Co., of Boston. The peculiar advantage claimed was that this valve, which is applicable to any system of continuous heating, can be set by the engineer to reduce the boiler pressure to any desired pressure in the train. The valve can also be adjusted so that any given pressure can be obtained by any relative position of the handle. A dash-pot in the valve prevents chattering. The valve is strongly made and is used on the Boston & Albany and other roads.

Mr. R. G. CHASE (Williames system of heating) explained the leading features of this method, which has hitherto been used only on the Central Vermont for heating cars, but has been largely used for heating buildings. The essential principle of this system is the method of circulation, which is caused by a vacuum pump placed at the end of the return pipe. Steam from the locomotive passes through pipes with couplings between the cars, etc., in the ordinary way, and any arrangement of these parts is possible, the vacuum pump being the essential feature. Instead of passing water off by traps, and so to the ground, the condensation passes back to the vacuum pump. One advantage of having two lines of pipe is that the couplings between the cars are horizontal, and do not have to dip down below the draw-bar, forming a pocket for the lodgement of condensed water, as when a single line of pipe is used. A mill in Philadelphia, 1,811 ft. long by 96 ft. wide by three stories high, took three to four hours to heat with the ordinary system, and then there was considerable back-pressure on the engine. With the Williames system circulation was established in ten minutes after the exhaust was admitted. The pump, like the air-pump of the condensing steam engine, first removes the air and then the water, and then causes a rapid flow of steam. In addition to securing a rapid circulation this system has the merit of diminishing the amount of condensed water. Steam at about atmospheric pressure condenses at 212 degrees, but in a vacuum condenses at a lower temperature. As steam flows toward the pump of the engine the amount of vacuum increases and the pressure of the steam decreases, and consequently the condensed water is re-evaporated and thus the tendency to condense is neutralized. The return pipe passes through the water in the tender, which condenses the steam, and then the pump handles the water and discharges it on the ground. The pump used has a 4 in. diameter steam cylinder, 6 in. diameter of pump cylinder and 6 in. stroke. The steam to work it is admitted through a globe valve open a quarter of a turn, the pipe being ¾ in. diameter. Actual experiment has shown that the amount of steam used by the pump is not sufficient to heat one car. The exhaust in the Westinghouse pump is ample to heat six cars. When the temperature was 14 degrees above zero a train of cars was kept at a temperature of 76 degrees for a run of 121 miles, 9 out of 14 ventilators in each car being open. In very cold weather live steam may be used. The length of train is no obstacle to the use of the system, for we have heated by exhaust steam a building in Philadelphia containing enough pipe for a train of 300 passenger cars, and even with this great length there was a vacuum of 4 in. in the cylinders of the engine from which the exhaust was derived. No escape of steam is possible in the event of an accident, for should a coupling or pipe be fractured air would rush in instead of steam escaping. The vacuum formed is capable of lifting the condensed water, and he claimed for his system that there was no danger of freezing, and no traps and no air valves are necessary. He did not claim a perfect coupling, but the one used was tight and automatic.

Mr. J. G. PENNYCUICK then described his apparatus for heating and ventilating cars by means of hot water and setting up the circulation, by means of a steam jet, and urged the great importance of ventilation. This system is illustrated and more fully described in another column.

Some questions were asked as to the pin in the ball and socket coupling being liable to be stolen. Mr. Pennycuick replied that this was unlikely and that a spare pin could be carried by each car.

Mr. MIGNEAUX considered that the ball and socket joint would only last six weeks, owing to the vibration in running. Slip or expansion joints used in pipes for heating houses will only last two months, though there is no vibration. Asbestos packing will not last unless kept from water, which turns it to pulp.

Mr. E. Y. BELL did not believe in steam heating, but advocated making the present stove safe until steam-heating is perfected and a universal and uniform system of coupling adopted. He showed a model of a stove which was surrounded by an iron safe, which shuts up when the car gives any violent lurch, as in collision or derailment. He considered the present laws forbidding the use of stoves in cars to be unconstitutional, though similar laws would probably be passed in New Jersey, Pennsylvania, Illinois, Indiana and other states. Various companies and individuals interested in steam heating were endeavoring to influence the legislatures to pass such laws. He considered that steam pipes would snap in collision and scald people. The apparatus he advocated, which was shown by a model, could be applied to the Johnson, the Spear, the Baker or the Barker-Smith heater and to almost all patterns of ordinary stoves. The cost as applied to a caboose stove would be about $20 to $25 each.

Mr. MARTIN (Martin system of heating) reminded the club that his system of heating had passed through an accident and that the cars were overturned and stripped of their trucks, and the ordinary stove, which had been left in the car, was hurled from one end to the other.* The pipes, however, were not broken, and no one was scalded. The only person who was hurt was the conductor, who was thrown against the stove, which was fortunately not in use, being superseded by the Martin system. The Martin system had never been taken out of a car to which it had been once fitted. They are now making 65 sets a month, and were enlarging their facilities so as to make 100, as they were several hundred orders behind hand. He believed that the safety, economy, and better and more equitable temperature obtained in the car made it worth while for railroads to alter their present arrangements so as to remove any inconvenience from cars standing at stations. The system was being applied to 14 different roads, and he is willing to put a trial train on any road that wishes to adopt some such system. He had purposely tested it on a very rough and crooked road in the oil regions of Pennsylvania, where the thermometer often went down to 25 degrees below zero. As regards Mr. Bell's assertion that heater men had done some lobbying in favor of their inventions, he denied it utterly, as far as he was concerned.

Mr. TYLER said as regards Mr. Bell's assertion that people would be scalded by the escape of steam, that when riding lately on a train heated by steam, the thermometer being 15 deg. above zero, he had found that the steam used when escaping at a cock would not scald the hand.

Mr. WOODWARD (Sewall Car Heating Co.) said his system had been used on the Maine Central, and cars were easily and successfully heated with steam on a crooked road running in a cold country. As regards water lodging in a dip in the couplings, he might remind the members that 1 lb. pressure will overcome 2.3 ft. head of water.

Mr. C. A. SMITH, the Secretary of the Club, asked some questions as to the law forbidding stoves being unconstitutional, and had heard that the automatic coupler law was also unconstitutional.

Mr. E. Y. BELL, as a lawyer, believed the law unconstitutional, because it would confiscate property and discriminate unjustly. He did not believe that the railroads need obey the law.

Mr. TYLER said many Massachusetts roads had neglected to get their stoves approved by the Railroad Commissioners and had thereby violated the law. They were now changing their stoves to an approved form as rapidly as possible.

Mr. BENJAMIN (the New York Safety Car Heating and Lighting Co.) thought that Mr. Bell's talk of confiscation was rather wide of the mark. Mr. Pullman had informed the speaker that it cost $100 a year to run a Baker heater and that steam heat would cost about $14. Therefore economy and not legal enactments would induce railroads to adopt the steam or continuous method of heating.

The Wilder system of heating adopted by their company, by applying the heat underneath, secures circulation without altering the apparatus inside the car. One form of their device was specially applicable to the Baker heater and another form was specially suited to the Spear heater, the air being heated by a suitable steam radiator placed beneath the car. The large body of water, 45 to 65 gallons, in the pipes of the Baker heater gives a reserve of heat, preventing the car cooling down suddenly when detached from the engine. They also had a third device for injecting live steam into water. Their coupling was wholly above the platform, so that no water could lodge in the coupling. The lever was out of harm's way, and the coupling could be made without getting under the car. Any system which has a reserve store of heat has the danger of freezing, and therefore it is impossible to obtain a system which possessed the advantages of being able to maintain its heat for some time and to be also free from any liability to freeze up. They were equipping trains on 35 different railroads, and proposed to establish central stations for heating up cars at large depots. Pipes from a central boiler would radiate to the various tracks and heat the cars before they were attached to the engine. They also had an arrangement for utilizing the steam blown off at the pop valve.

Mr. BENJAMIN questioned a statement that the Martin system had been adopted by the New York Central as stated by Mr. Martin, as the Wagner cars and the vestibule train on the New York Central were being fitted with the system which he represents.

Mr. BELL thought that both gentlemen might be right, as railroad contracts were generally conditional and bound the roads to little or nothing.

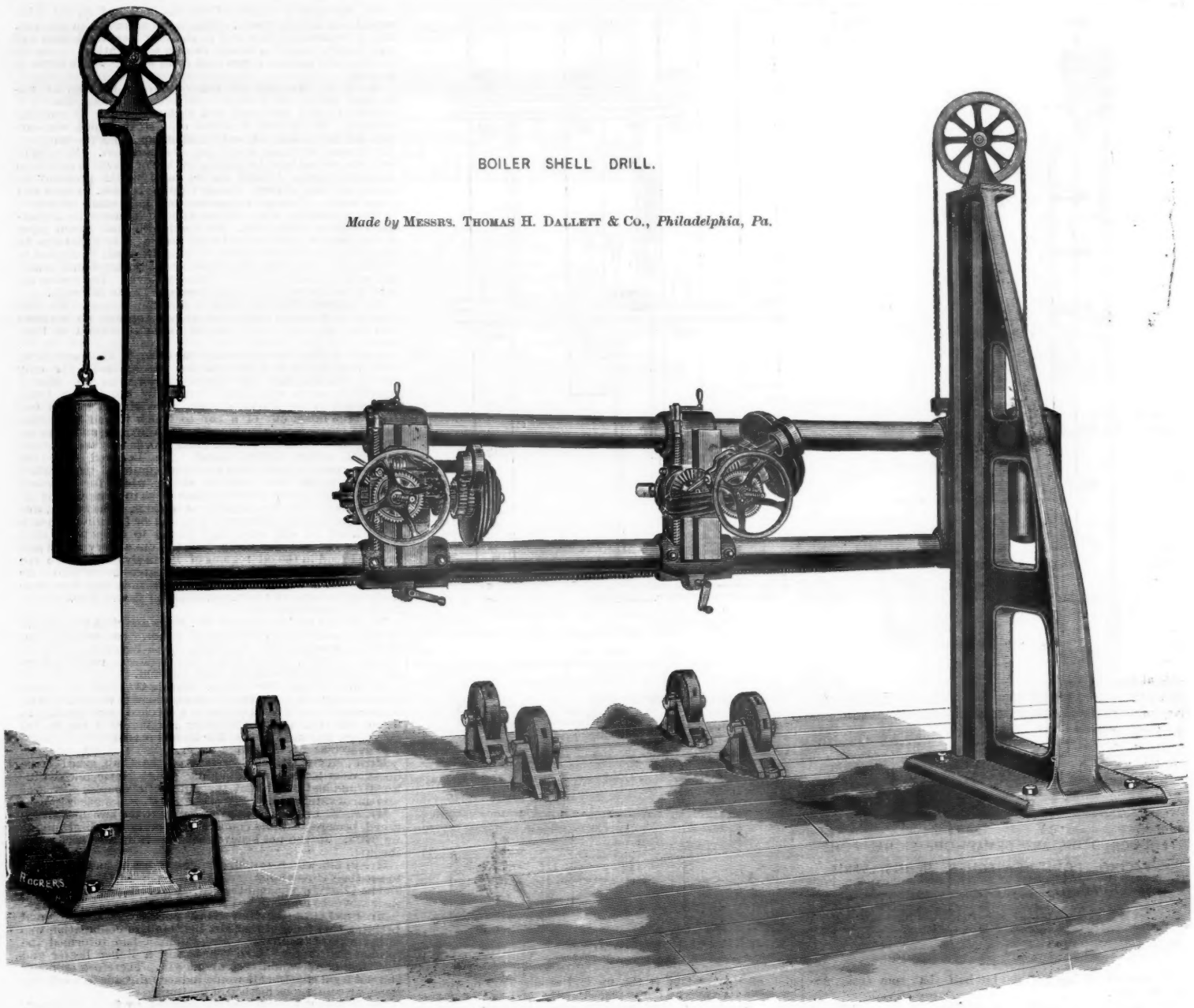
Mr. DAWSON then explained the Frost dry carburetter system of lighting. It was used on the Pennsylvania, the Norfolk & Western, the New York, New Haven & Hartford and other roads. Air was taken from the Westinghouse pipe, passed through a dry carbureter and thence to the burner, the pressure being suitably regulated and reduced. There is no liability to condensation, even in the coldest weather, as the carbureter is kept warm by the lamp. Before the lamps are lit the air is admitted by means of a cock to the carbureters. The carbureters are filled with some 23 lbs. of cotton, holding 14 lbs. of oil. As each pound of cotton is capable of absorbing 3 lbs. of oil, the carbureters, even when fully charged, are perfectly dry, and in the event of any accident no oil could escape. The material used is 88 gasoline.

When the carbureters are charged with the ordinary amount—2 gallons each—the light will burn for 50 hours. A mercury gauge devised by Dr. Dudley, of Altoona, whose advice and assistance has been very valuable in perfecting the apparatus, will indicate when the carbureter wants re-oiling. Their principal claim was economy and an abundance of light. In regard to the first claim, no plant was wanted outside of the car for charging except a 2 or 5-gallon oil can. The repairs were very small, for in one year's service on one car the only breakages were 4 chimneys, worth 5 cents each, and one porcelain globe, the latter being broken by the fall of a ladder unconnected with the system of lighting. On the

*This accident was illustrated in the *Railroad Gazette*, Feb. 11, 1887.

BOILER SHELL DRILL.

Made by Messrs. Thomas H. Dallett & Co., *Philadelphia, Pa.*



New York & New Haven a car was lit with 5 lights at a cost of 4 cents per hour for the entire car. The light was not only abundant, but was soft and evenly distributed. There was no shadow and the finest print could be read everywhere in the car The draft was not affected by the wind or by leaving doors or windows open. Their system also produced an excellent ventilation. At Altoona an experiment was made to test this. All the windows, doors and ventilators were tightly closed and the lamps lit, but in 1½ hours the temperature had not risen one degree, though 18 people were in the car. This showed that the lamps produced a circulation of air in the car, drawing in good air and ejecting foul. The ventilator had no down draft.

Mr. Barrett (Springfield) then explained the method of lighting cars by electricity used on the Connecticut River Railroad. He claimed that this method was superior to that on the Boston & Albany and cheaper than lamps A steam pipe carrying 130 lbs. of steam was run through the train to a dynamo in the baggage car. The extra cost was $1,500 to $1,800 and the extra weight about 1,500 lbs. The system could be used in connection with the Julien or any other accumulator.

Mr. Migneaux briefly explained his system of ventilation. An exhausting fan was driven by the motion of the car and exhausted the foul air from the car. The fan was on the Sturtevant principle, and when the train was running at 45 miles an hour would run about 2,000 revolutions a minute.

Mr. Struck then explained his arrangement of stoves, and the meeting adjourned at 11 p. m. until the next meeting on Nov. 17.

Boiler Shell Drill.

The accompanying engraving represents a machine for drilling boiler shells, which has been very recently designed and built by Messrs. Thos. H. Dallett & Co., of Philadelphia.

It is specially adapted for drilling rivet, stay and bolt holes in the shell after the plates have been bent to proper form. The advantages of drilling a shell after the plates are bent and in place will be appreciated by all, as the accurate laying out, which is very necessary when the plates are drilled separately, is not required, and there is but one handling for both plates, in both the laying out and the drilling.

The machine is made in two styles, A and B. The A style consists of a turntable on which the boiler shell is set on end, and around which are drilling heads.

The novel feature of the machine consists in the use of the driving apparatus of Messrs. Dallett's portable drills for driving the drilling heads, thereby obtaining a simple and an effective arrangement.

In the B style, the latest design of which is shown in the accompanying illustration, the boiler shell is placed horizontally on four or six rollers on which it may be revolved freely.

The drilling heads, driven in the same manner as in the A style, are supported by two horizontal beams, these in turn being supported at either end by uprights, the weight of the heads and beams being counterbalanced so that the whole can be readily raised or lowered.

The heads are easily moved horizontally by means of a pinion gearing into a rack on the lower beam, and there is an adjustment between the beams regulated by a screw, which two motions give the operator a quick and delicate means of setting the drill after the shell has been turned to near the required place.

Care has been exercised in the design of the head to make it handy, so that the operator, standing on either side, has full control of both crank handles, which materially assists in setting the drill quickly.

The machine is adapted for drilling all sizes and kinds of boiler shells, from large marine work to small stationary, and can be built of any length and with any number of heads.

The Noble Nut-lock and Washer.

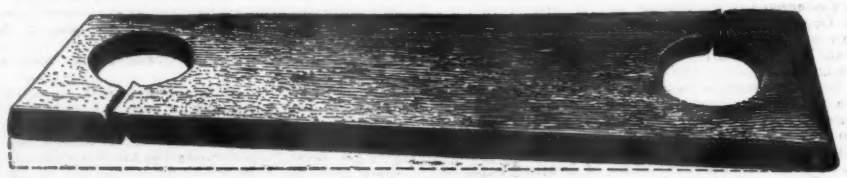
The accompanying illustration represents the "Noble" nut-lock and washer, especially designed for track bolts and manufactured by the A. French Spring Co., of Pittsburgh.

The washer is made, as shown, of a piece of spring steel of good quality, 1½ in. × ¼ in.; hardened in oil, tempered and tested. It is made with a twist or torsion, and can be screwed up flat as shown by the dotted lines.

When the washer is screwed completely flat the slit at the bolt holes will automatically secure the nut at any part of its turn. If the nuts have not moved at the expiration of three, six or nine months, and the washer is off from the angle plate at the diagonal corners, the distance, $\frac{1}{32}$ in. or $\frac{1}{16}$ in., equals the amount the angle plates have worn and closed into the rail in seating, but the bolts still having a tension of 2,000 to 3,000 lbs. each, as shown by the Riehle tests given below. This tension on bolts will keep the joint tight, and it will not rattle, and when the washer is screwed flat the second time it will remain so, as the plates have become well seated to the rail. The expense of the frequent application of the wrench is thus saved, and better joints are obtained. The distance the washer is off at the corners at any time is the wear of the plates, and the distance they have closed into the rail can be plainly seen. It is claimed that this demonstrates conclusively the mistake of the nut-lock and grip-bolt theory, and shows that loose joints are not caused by the nuts turning back on the bolts, but by the wear of the bearing surfaces of the angle-plates on the rails. It is consequently not practicable to have fair average joints and follow up this wear by the frequent application of the wrench.

It is claimed that one-coil spring washers are not strong enough to maintain a tension on the bolt after wear has taken place, and that if springs of that class be made of larger section than at present, the temper must be reduced, impairing the value of the one-coil washer as a spring. It is claimed that a torsional spring as shown gives the greatest strength for a given weight of material, and that practical tests during the last four years with washers of thicknesses varying from ⅛ in. to ⅝ in. have shown that the size shown, ¼ in. thick, is best adapted for the work.

The following table gives the result of tests made by the Philadelphia Scale and Testing Machine Works by Messrs. Riehle Brothers on Oct. 3, 1887.



The Noble Nut-Lock and Washer.

"A Noble elastic track-joint washer for the Houston & Texas Central Railroad was subjected to compression with the following results. The dimensions of the washer were as follows: Length, 6⅛ in.; width, 1.440 in.; thickness, .253 in.; centres of holes, 4 31/32 in.; diameter of holes, ⅞ in.

Set of washer at diagonal corners.	In.	Compressive strain. Lbs.
Before test	.150 (3/32 bare).	....
	.125 (1/8)	200
	.0937 (3/32)	1,300
	.0625 (1/16)	4,270
	.0312 (1/32)	6,000
Flat all across, end to end.....		11,400

"After strain was removed, a permanent set of .03 in. was observed, or .27 in. against .30 in. full elevation of one corner, the other diagonal corner being depressed.

"Measurements were all made from extreme diagonal corners, which could be seen more clearly than other points."

This joint is in extensive use on the Southern Pacific and the Houston & Texas Central, the latter road having 185 miles of track laid with the Noble washer. It is also in use on several other roads.

The following extracts from a letter from Mr. L. C. Noble will serve to explain more fully the principle of this device:

"My position on the joint problem and how to better it is different from that of all others except the one coil spring. All have aimed to produce a device that would lock a nut, claiming the joint got loose on account of the nuts working loose. This I say is a mistake, nuts on track bolts do not turn back on the bolts until all parts of the joint are loose, and the defect is the wear of the angle plates and rail. Such being the fact, any device that only locks a nut does not help the joint, but merely prevents the nut from jarring off after the joint is loose, hence I believe the nut-lock theory is a mistake, because nut-locks do not overcome the real defect, the wear caused by friction.

"In order to illustrate my ideas, take one of my washers and screw it to the angle plate flat all across as it is applied to the joint. Mark the nuts, and after six or twelve months time the nuts will be found as they were put on, not having moved, but the washer is found to stand off from the angle plate at the diagonal corners. This distance is the amount the plates have worn and closed into the rail. With the ordinary nut lock devices the joint would be loose from the time this wear commenced, but the strong tension on the bolts given by my washer reduces the wear because the washers seat the plates their whole length to the rail. The nearer a perfect fit the less the wear, and the strong tension obtained by my washers will prevent the joints rattling, and render unnecessary the frequent application of the wrench, as is the present practice.

"My washer or any other that has sufficient tension on the bolts to seat the angle plates to the rail and keep them there, will reduce the wear caused by friction and secure the joint in all its parts and make as permanent a joint as can be made by securing two rails with angle bars and bolts. The joints will not require to be tightened more than once or twice a year, depending on the traffic.

"Any device that will not show 3,000 lbs. tension on the bolts at all times will not do the work satisfactorily. The one-coil spring will not and cannot be made to do it. The size of material that can be used in a spring of this shape is governed by the length of the coil. If the size is increased above the limit and properly tempered as a spring to recover when compressed, 50 per cent. of the coils will break, and therefore the temper has to be lowered, destroying their elasticity and causing a permanent set under compression."

Train Accidents in September.

COLLISIONS.

REAR.

1st, p. m., on East Tennessee, Virginia & Georgia, a freight train ran into the rear portion of a preceding freight which had broken in two and started back down grade, damaging an engine and several cars.

2d, on Lake Erie & Western, near Lafayette, Ind., rear portion of a switching freight got away from the trainmen and ran down grade and into another freight, wrecking an engine, caboose and several cars.

3d, a. m., on Burlington & Missouri River, near Ashland, Neb., a freight ran into a preceding freight, damaging engine and several cars.

5th, a. m., on Fitchburg road, at Williamstown, Mass., in making a flying switch the engine of a construction train ran into the rear of a freight train standing on the main track, damaging engine and caboose; 2 trainmen fatally and another slightly injured.

6th, early, on New York, Lake Erie & Western, near Oxford, N. Y., a freight ran into a preceding freight, wrecking an engine and several cars. The wreck caught fire and was partly consumed.

6th, early, on New York & New England, at Union City, Ct., a locomotive ran into the rear of a freight train, badly wrecking the engine, and fatally injuring a brakeman.

6th, on New York, Lake Erie & Western, near Goshen, N. Y., a coal train broke in two and rear section ran back down grade and collided with a following freight, damaging the engine and a number of cars.

7th, p. m., on Chicago, Burlington & Quincy, near Afton, Ia., a fast mail train ran into a preceding passenger train, wrecking an engine and several cars; 1 passenger killed and 9 more or less severely injured. The first train was delayed by a stalled freight and the second train misunderstood or neglected the signal to stop.

8th, on Green Bay & Winona, near Marshland, Wis., a freight ran into cars which a preceding freight had left standing on the main track, doing some damage and seriously injuring a brakeman.

9th, early, on West Shore, near Canastota, N. Y., a freight ran into a preceding freight standing on the main track taking water, doing some damage.

10th, on Texas & Pacific, at Honey Grove, Tex., a passenger train ran over a misplaced switch and into a freight train, injuring a trainman seriously and several passengers slightly.

11th, night, on New York Central & Hudson River, a freight ran into some cars standing on a siding at Mott Haven, N. Y., doing some damage.

12th, early, on New York, Pennsylvania & Ohio, near Burbank, O., a freight train ran into a preceding freight, damaging an engine and several cars and killing a brakeman. There was a heavy fog at the time.

12th, early, on New York, Pennsylvania & Ohio, in Peoria, O., a passenger train running at considerable speed collided with a locomotive standing on the main track; 1 engineer killed, another fatally and a fireman seriously injured.

12th, a. m., on New York, Lake Erie & Western, in Greycourt, N. Y., a passenger train ran into a milk train, doing slight damage.

12th, on Chicago, Kansas & Nebraska, at Sanford, Kan., a passenger train ran over a purposely misplaced switch and into freight cars standing on a siding, doing considerable damage.

13th, early, on Central of New Jersey, a freight train ran into the rear of a coal train which had stopped to take water at Dunnellen, N. J., wrecking an engine, caboose and several cars, and killing the engineer.

16th, on East Tennessee, Virginia & Georgia, at Sweetwater, Tenn., a passenger train ran into the rear of a freight, badly injuring the engineer.

17th, on Central Pacific, at Sobrante, Cal., a freight train just going into a siding was run into by a closely following freight, doing slight damage.

17th, on Chicago & Alton, near Sherman, Ill., a freight train broke in two and the rear portion afterward ran into the forward one, damaging several cars.

17th, on Northern Pacific, near Portland, Or., an officer's train was run into by a freight train, slightly injuring one of the occupants.

19th, p. m., on Brooklyn Elevated, in Brooklyn, N. Y., a passenger train ran into an engine switching at the Wyckoff avenue station. The train together with the switching engine kept on for some distance after the collision and ran into the engine of another train standing on the main track. A fireman and a conductor were seriously injured, and 5 passengers were also hurt.

20th, very early, on Chicago, Milwaukee & St. Paul, near Canton, Dak., the front of a passenger train was run into by some cars which had broken loose from a freight train switching at Inwood, Ia. (a short distance east), and run back down the grade. Engine, baggage, mail and 7 freight cars and a caboose were badly wrecked; 2 trainmen and a man asleep in the caboose were killed.

20th, early, on Pittsburgh, Fort Wayne & Chicago, near Forest, O., a disabled freight train was run into by a closely following train, making a very bad wreck and killing the fireman. Several cars of oil became ignited and the greater portion of the wreck was consumed. While trainmen were endeavoring to subdue the fire, a car loaded with dynamite exploded with terrific force, tearing up the track badly and injuring a trainman and a tramp.

21st, a. m., on South Carolina road, near St. Matthews, S. C., a freight ran into the rear portion of a preceding freight, doing some damage and killing a brakeman.

24th, on Chicago, Burlington & Quincy, near Princeton, Ill., a freight train broke in two on a hill, and rear section ran into forward one, doing considerable damage.

24th, on Memphis & Charleston, near La Grange, Tenn., a freight ran into a preceding freight, wrecking an engine and caboose.

24th, on Northern Pacific, near Olequa, W. T., a freight train ran into the rear of a passenger train, damaging the engine and a passenger car.

25th, on Baltimore & Ohio, at Tiffin, O., a passenger train struck a coal car which had been left standing on the main track, damaging the engine and injuring the engineer and fireman.

25th, on Burlington & Missouri River, near Crete, Neb., a freight train broke in two and the rear section ran back down grade and into a following passenger train; engine, baggage and several freight cars thrown from the track; engineer seriously injured.

26th, a. m., on Michigan Central, near St. Thomas, Ont., in a dense fog, a freight ran into a preceding freight, damaging several cars. Two cars were destroyed by fire, which was communicated from the stove in the caboose.

27th, early, on Boston & Albany, near North Grafton, Mass., a freight ran into the rear end of a way freight which was switching (partly on the main track), and demolished 15 cars, killing a brakeman and injuring another. There was a fog at the time, and apparently the signalman sent back did not go far enough.

29th, on Lehigh Valley, near Shenandoah, Pa., a passenger train ran into several cars of a derailed freight at a curve, damaging an engine, caboose and several freight cars.

29th, p. m., on New York, Lake Erie & Western, near Mahwah, N. J., a freight ran into the rear of a preceding freight, wrecking the engine and several cars. Engineer jumped and was injured.

29th, night, on New York, Lake Erie & Western, near White Bridge, N. Y., a freight train just going on a siding was run into by a fast stock train, wrecking the engine and 8 cars.

30th, on St. Paul, Minneapolis & Manitoba, at Morris, Minn., a freight train ran into a preceding freight, damaging engine, caboose and one car.

30th, very early, on Missouri Pacific, at Park Station, Mo., a passenger train ran into a preceding passenger train which had stopped and sent out no flag. A lantern at the rear of the car that was run into exploded and fired the wreck, destroying 2 cars and the station building. Engineer and 4 passengers injured.

BUTTING.

1st, p. m., on Grand Trunk, near Sherbrooke, Que., a butting collision between two freights wrecked both engines and several cars, seriously injuring an engineer and a fireman.

3d, on New York, Pennsylvania & Ohio, near Geneva, Pa., a butting collision between two freights; both engines and several cars damaged.

4th, on Louisville & Nashville, at McKenzie, Tenn., a butting collision between a freight train and a light engine, badly wrecked both engines and killed a fireman.

4th, on Nashville, Chattanooga & St. Louis, in Memphis, Tenn., a butting collision between two switching engines wrecked both and killed a fireman.

5th, on Philadelphia & Reading, in Williamsport, Pa., a butting collision between a freight and a gravel train wrecked 2 engines and several cars, killing a brakeman. The conductor of the gravel train is said to have disregarded orders.

7th, on Wisconsin Central, in Schleisingerville, Wis., a butting collision between two passenger trains caused some damage and injured a passenger slightly. One of the trains was just going in on a siding.

7th, night, on Jeffersonville, Madison & Indianapolis, in Louisville, Ky., a butting collision between a passenger train and a switching engine demolished both locomotives and slightly injured a passenger.

9th, on Southern Pacific, near El Paso, Tex., a butting collision between a passenger train and a freight damaged the engine and several cars of each train, injuring several passengers.

10th, on Northern Pacific, near Lake Pend d'Oreille, Wash. Ter., a butting collision between a freight and a construction train wrecked both engines and several cars.

10th, night, on Cumberland Railway, near Springhill Junction, N. S. butting collision between a passenger train and a freight, wrecked both engines, injured an engineer fatally and 3 other trainmen severely.

11th, very early, on New York Central & Hudson River, near Rome, N. Y., a butting collision between two freights wrecked 3 engines and 12 cars. There was a dense fog at the time.

11th, on Missouri Pacific, near Jefferson, Mo., a butting collision between two freights piled up two engines and 20 cars in a bad wreck. Cause, misunderstanding of orders.

11th, on Ohio River road, near Benwood, W. Va., a butting collision between a passenger train and a freight train on a trestle damaged both engines, baggage car and smoker, and threw 5 freight cars off the trestle, demolishing them completely. A brakeman and a passenger slightly injured.

12th, early, on Pennsylvania, near Johnson, Pa., a butting collision between two freights piled up both locomotives and several cars in a very bad wreck, blocking the road for some time.

12th, a. m., on Southern Pacific, near Park Station, Cal., a butting collision between two passenger trains, owing to misunderstanding of orders, damaged both engines and injured a fireman.

12th, on Southern Pacific, near Los Angeles, Cal., butting collision between two passenger trains, damaging both engines.

12th, on New York, Pennsylvania & Ohio, near North Lewisburg, O., a butting collision between a passenger train and an empty engine badly wrecked both engines, killed 1 train-man and fatally injured 3 others.

13th, early on Chicago & Grand Trunk, near Charlotte, Mich., a butting collision between two freights piled up the engines and 16 cars in a very bad wreck, seriously injuring an engineer. Cause, dispatcher's mistake.

13th, on Pittsburgh & Western, near Newcastle Junction, Pa., a butting collision between a freight and a gravel train demolished both engines, killing an engineer.

13th, on St. Louis, Iron Mountain & Southern, near Jacksonville, Ark., butting collision between two freights, damaging both engines and setting a fire which burned a portion of both trains. Mistake in orders.

13th, p. m., on New Jersey Southern, at Eatontown Junction, N. J., a passenger train running at considerable speed ran over a misplaced switch and into the head of a freight standing on the turnout. Both engines and several cars in each train were badly wrecked; 4 passengers injured.

14th, on Baltimore & Ohio, near Lexington, O., butting collision between an officer's train and a freight, slightly damaging both engines and injuring one of the officers. An operator failed to hold the freight.

14th, on Fitchburg road, at Pownal, Vt., a passenger train ran over a misplaced switch and into the head of a freight standing on a side track, doing some damage.

14th, night, on Western & Atlantic, in Sugar Valley, Ga., a misplaced switch caused a butting collision between a passenger train and a freight, damaging both engines and several cars of the passenger train; 4 trainmen injured.

15th, night, on St. Louis, Iron Mountain & Southern, near Nettleton, Ark., a butting collision between two construction trains badly wrecked both engines, killed 3 trainmen and injured 7 others.

17th, on Minneapolis, Lyndale & Minnetonka, in Minneapolis, Minn., butting collision between two passenger trains damaged both locomotives considerably.

17th, p. m., on Lake Shore & Michigan Southern, near Toledo, O., a butting collision between two freights wrecked both engines and several cars. The wreck caught fire and was partially destroyed.

19th, a. m., on Chicago, Milwaukee & St. Paul, near Dubuque, Ia., a butting collision between two passenger trains badly wrecked two engines and several cars, killing 5 trainmen and injuring 6 passengers. Cause, "mistake in giving or understanding orders." There was a dense fog at the time.

19th, p. m., on Pennsylvania, near Retreat, Pa., a butting collision between two freights piled up the engines and the greater portion of each train in a complete wreck, fatally injuring 3 trainmen. The wreck took fire, and, having been saturated with the contents of several oil cars, burned rapidly and exploded 4 cars of powder, hurling the blazing debris in every direction. Cause, dispatcher's mistake.

22d, a. m., on Pittsburgh, Ft. Wayne & Chicago, near Lima, O., an east-bound passenger train trying to reach a side-track collided with a west-bound passenger train. Both engines and a mail car badly damaged. An engineer jumped and was seriously hurt. The report states that the brakes of one of the trains did not work properly.

22d, on Baltimore & Ohio, near Duncan's Falls, O., a butting collision between two freights wrecked the engines and several cars. A tramp stealing a ride was seriously hurt. Cause, mistake in orders.

22d, on Atchison, Topeka & Santa Fe, at Guthrie, I. T., a butting collision between a light engine and a construction train badly wrecked the locomotives and 12 cars; a trainman fatally and another seriously injured and several laborers hurt.

22d, p. m., on Philadelphia & Reading, near Shamokin, Pa., in a butting collision between freights 2 engines and 10 cars were badly damaged, blocking traffic for some time.

22d, night, on Intercolonial road, in a snow-shed near Little Meties, Que., a butting collision between 2 freight trains piled up the engines and a dozen cars in a very bad wreck; 1 trainman killed and 3 injured. Cause, forgotten train orders.

24th, a. m., on Jacksonville Southeastern, near Jacksonville, Ill., a freight train ran over a misplaced switch and into an engine standing on a siding; both locomotives and several cars damaged.

25th, a. m., on Missouri Pacific, in Holden, Mo., a passenger train ran over a misplaced switch and into the front of a freight standing on a siding, wrecking the engines and damaging several cars. Engineer jumped and received serious injuries; 2 tramps, stealing a ride, were killed.

25th, on New York, Lake Erie & Western, at Osage City, N. Y., a freight train backed into a siding and struck a lot of cars with such force as to demolish one of them.

26th, a. m., on Connecticut River road, in Holyoke, Mass., a butting collision between a switching engine and a passenger train which was being moved backward. The engine and 1 car were damaged.

26th, on Chicago, Rock Island & Pacific, near Trenton, Mo., a butting collision between two freights wrecked both engines and several cars, injuring a fireman and a conductor.

26th, night, on Delaware, Lackawanna & Western, near Summit, N. J., a butting collision between a passenger train and a freight wrecked both locomotives; 2 trainmen killed and 6 injured.

29th, a. m., on Indianapolis & Vincennes, at Maywood, Ind., a butting collision between a passenger train and a freight slightly damaged the engines. It is said the watch of the freight engineer was 10 minutes slow.

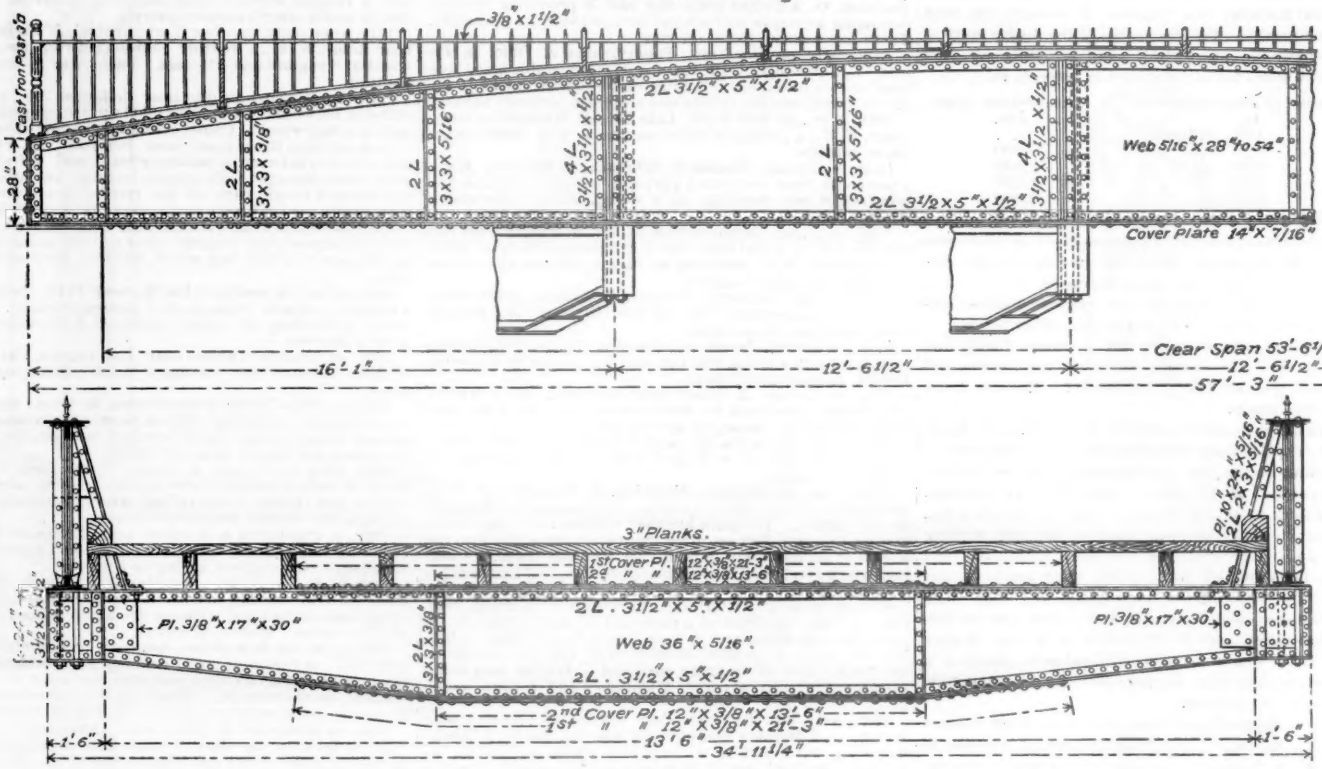
30th, on Chicago & Northwestern, near Ames, Ia., a butting collision between two freights wrecked both engines and 15 cars. Mistake in orders.

30th, night, on Louisville & Nashville, near Birmingham, Ala., a butting collision between two freights wrecked both engines and quite a number of cars; a trainman badly hurt.

CROSSING.

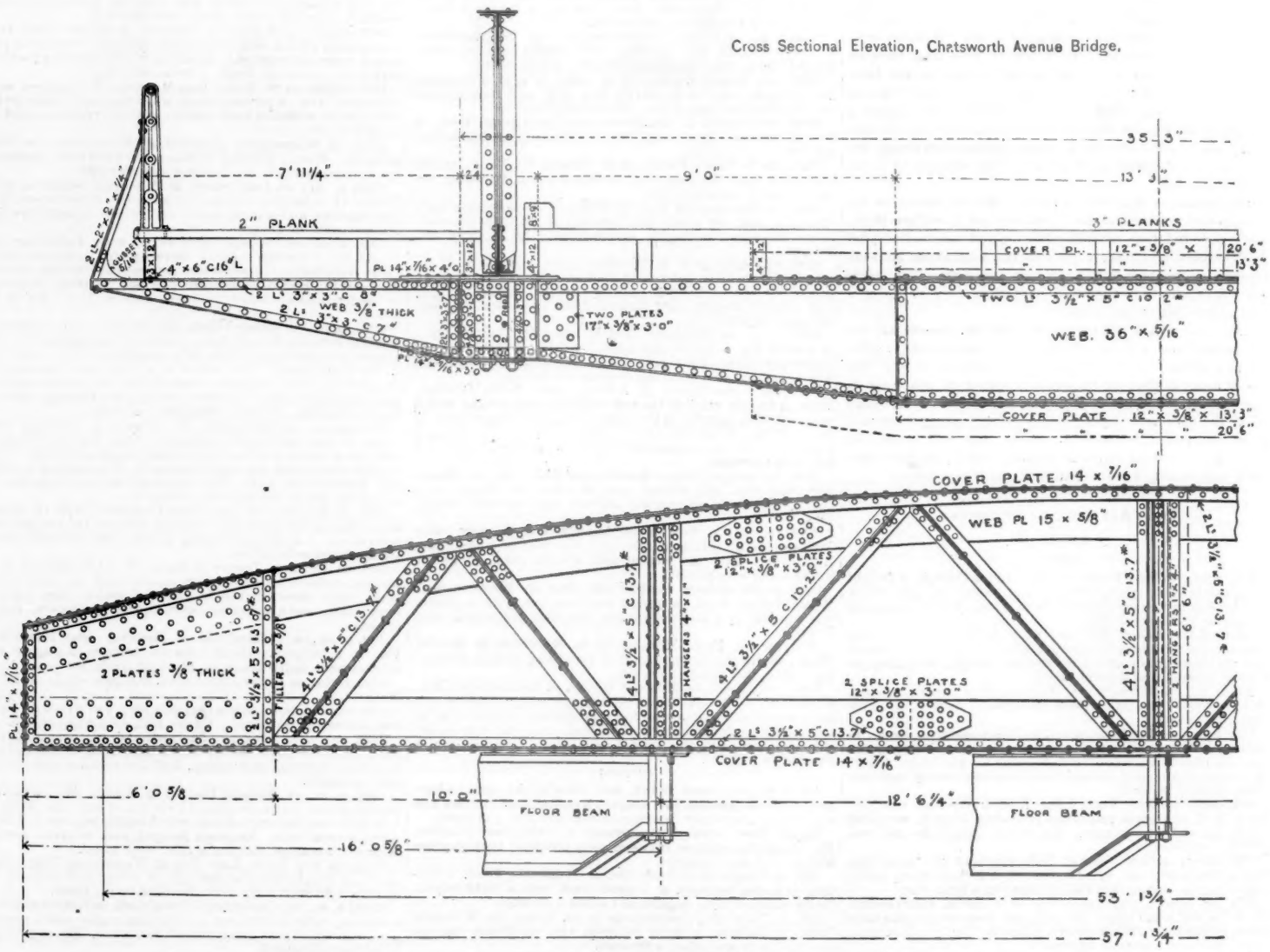
8th, night, a St. Joseph & Grand Island passenger train

Truss, Jerusalem Road Bridge.



Cross Sectional Elevation, Jerusalem Road Bridge.

Cross Sectional Elevation, Chatsworth Avenue Bridge.



Truss, Chatsworth Avenue Bridge.

STANDARD HIGHWAY BRIDGES, NEW YORK, NEW HAVEN & HARTFORD RAILROAD.

was run into by a Burlington & Missouri River freight at the crossing in Hastings, Neb., damaging an engine and 2 cars; 1 passenger killed and several injured.

15th, night, on Minnesota & Northwestern, at Wilson Junction, Ia., a passenger train ran into another passenger train at the crossing, turning a sleeping car bottom side up, injuring three passengers.

28th, in Mansfield, Ill., a Wabash freight ran into an Indiana, Bloomington & Western freight which had stopped on the crossing, damaging an engine and several cars.

DERAILMENTS.

DEFECTS OF ROAD.

2d, a. m., on Denver & Rio Grande, near Salida, Colo., a passenger train went through a bridge over Beaver Creek, which had been seriously impaired by a large rock falling on it from the side of a canon. Engineer killed, several passengers injured.

3d, a. m., on Union Pacific, near Valley, Neb., 18 cars of a freight derailed by the spreading of the rails.

6th, p. m., on New York, Lake Erie & Western, at Carpenter's Point, N. Y., an engine derailed by a broken frog.

10th, on Lake Erie & Western, near Lafayette, Ind., 10 cars of a freight went through the bridge over Wildcat Creek and were completely wrecked.

13th, a. m., on Colorado Midland, near Lake Ivanhoe, Col., the engine and two cars of a construction train were ditched while passing over a new piece of track laid on marshy ground, killing 4 laborers and injuring 61 others more or less severely.

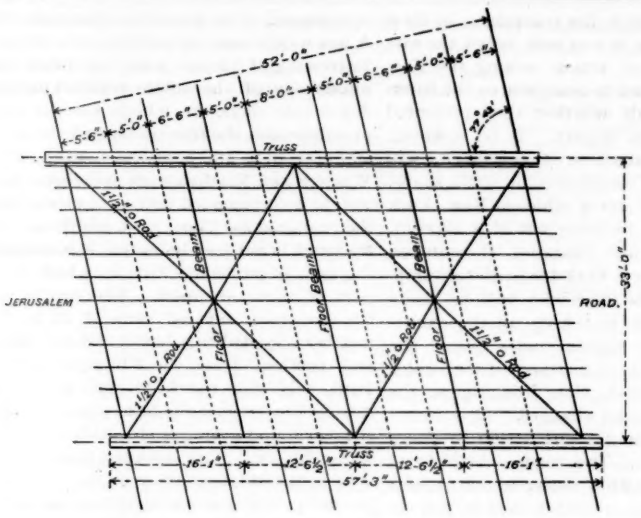
16th, night, on New York & Brooklyn Bridge road, a passenger car was turned lengthwise across the track, owing to the failure of the rear truck to run over the switch properly, obstructing travel for some time.

21st, a. m., on Texas & Pacific, near Texarkana, Ark., the engine and 14 cars of a freight were derailed by a defective switch and considerably damaged.

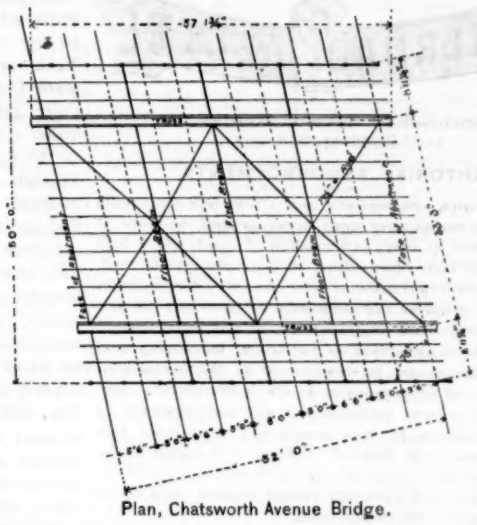
22d, on Texas & Pacific, near Putnam, Tex., engine and several cars of a stock train derailed by a defective switch.

27th, a. m., on Alabama Great Southern, near Fort Payne, Ala., a passenger train struck a broken rail and 2 cars were thrown from the track and badly damaged, injuring several passengers.

29th, p. m., on St. Joseph & Grand Island, near Fairbury, Neb., rear car of passenger train derailed, injuring the con-



Plan, Jerusalem Road Bridge.



Plan, Chatsworth Avenue Bridge.

STANDARD HIGHWAY BRIDGES, NEW YORK, NEW HAVEN & HARTFORD RAILROAD.

ductor and a passenger. It is said that the track was very rough.

30th, on Central of Georgia, near Tennille, Ga., several cars of a passenger train derailed by a broken rail.

DEFECTS OF EQUIPMENT.

1st, a. m., on Louisville & Nashville, near Cooper's Station, Ala., an axle under a freight car broke as the train was crossing a trestle and 5 cars were derailed and considerably damaged.

2d, early, on Pennsylvania Railroad, at Ernston, N. J., 13 loaded cars of a freight were derailed and wrecked by the breaking of an axle.

4th, night, on New York, Lake Erie & Western, near Avon, N. Y., a car containing some valuable horses was derailed by the breaking of a wheel and rolled down an embankment. A groom in charge of the horses was killed and several horses were injured.

6th, night, on New York, Lake Erie & Western, near Port Jervis, N. Y., several cars of a freight were derailed by a broken journal.

10th, p. m., on Atlanta & West Point, near Puckett Station, Ala., several cars of a freight derailed by the breaking of an axle.

10th, p. m., on Baltimore & Ohio near Rodamer's Station, W. Va., a passenger train descending a steep grade became unmanageable owing to the improper working of the brakes; the engine, tender and 2 baggage cars left the track at a bridge and plunged into a deep ravine, killing a trainman.

12th, noon, on Baltimore & Ohio, near Martinsburg, W. Va., a passenger train derailed by the breaking of an axle; 1 passenger injured.

14th, a. m., on Central of Georgia, near Outland's Station, Ga., 7 cars of a freight train derailed and badly damaged by the breaking of an axle.

14th, a. m., on Port Royal & Western Carolina, near Atlanta, Ga., a wheel under a freight car broke and derailed 9 cars on a bridge over a canal. The bridge was badly damaged.

17th, a. m., on Boston & Maine, in Medford, Mass., while making a flying switch the engine of a passenger train crashed through the wall of an engine-house and was damaged. "Failure of brakes" is given as the cause.

17th, on Louisville, New Albany & Chicago, near Hammond, Ind., 3 cars in a passenger train derailed by a broken tender wheel.

19th, a. m., on Indianapolis & St. Louis, near Fern, Ind., the engine and all but the last car of a passenger train were derailed, it is supposed, by the breaking of a wheel under the tender, which was badly wrecked and the engineer and fireman killed.

21st, a. m., on New York, Lake Erie & Western, near Gulf Summit, N. Y., a freight train derailed by a broken truck. A brakeman killed.

27th, a. m., on Mobile & Ohio, near Jackson, Tenn., passenger train derailed by a broken truck and thrown down an embankment; 2 trainmen and 3 passengers injured.

27th, p. m., on Cleveland & Canton, in Cleveland, O., a car of a special passenger train was derailed by the dropping of a brake-beam.

29th, on Missouri Pacific, near Caney, I. T., the engine and 10 cars of a freight train were derailed and wrecked by a broken wheel, killing a tramp.

NEGLIGENCE IN OPERATING.

2d, night, on Union Pacific, near Lawrence, Kan., an engine and several cars of a coal train derailed by a misplaced switch and badly wrecked; engineer and brakeman killed, fireman fatally injured.

3d, p. m., on Central of New Jersey, at Bergen Point, N. J., 3 loaded coal-cars were pushed off the end of a high trestle and completely wrecked.

3d, evening, on New London Northern, at Monson, Mass., as 26 cars, heavily loaded with granite, were being run down the steep grade from Flynt's quarry there was some misunderstanding about the switch at the junction with the main line and 10 of the cars were derailed, making a very bad wreck, which blocked the road for 24 hours.

9th, early, on Baltimore & Ohio, in Burton, W. Va., the engine and 20 cars of a freight were derailed by a misplaced switch and badly wrecked.

12th, on Jeffersonville, Madison & Indianapolis, at Sellersburgh, Ind., freight train derailed by a misplaced switch, several cars being thrown over a bank.

19th, on Duluth, South Shore & Atlantic, a runaway ore train plunged over a high embankment, wrecking several cars and killing a brakeman.

21st, a. m., on Fitchburg road, in Greenfield, Mass., passenger train derailed by a misplaced switch.

24th, very early, on New York, New Haven & Hartford, at Harlem River, N. Y., engine of a milk train derailed by misplaced switch and rolled down an embankment.

27th, on Philadelphia & Reading, at Chester, Pa., the engine and tender of a freight train went through an open draw of a bridge over Chester Creek.

30th, a. m., on Lake Shore & Michigan Southern, near Waterloo, Ind., 2 engines and 13 cars of a stock train derailed by a misplaced switch, causing considerable damage. A boy was killed, engineer and fireman slightly injured.

UNFORESEEN OBSTRUCTIONS.

3d, a. m., on New York, Lake Erie & Western, near Avon, N. Y., an excursion train ran into a freight wreck, ditching the locomotive and a passenger car, slightly injuring several passengers.

3d, p. m., on Fremont, Elkhorn & Missouri Valley, near Ainsworth, Neb., a stock train ran into a hand-car loaded with iron standing on the main track and was derailed, doing considerable damage, killing the fireman and fatally injuring the engineer.

6th, on Kansas City, Fort Scott & Gulf, near Seymour, Mo., a freight train ran over a mule and the engine and 14 cars were derailed and went over an embankment; 2 trainmen severely injured.

7th, p. m., on New York, Lake Erie & Western, in Jersey City, N. J., a locomotive and several cars of a freight train were derailed by a misplaced switch and damaged. It is supposed that the switch had been turned by boys.

10th, on Boston & Albany, in Boston, Mass., a passenger train struck a freight car projecting over the main track from a siding, doing slight damage.

10th, on the Southern Pacific, near Benson, Ariz., a passenger train derailed by a misplaced switch, supposed to have been turned by train robbers, injuring the engineer and fireman.

11th, p. m., on Ohio River, near Benwood, W. Va., a yard engine ran over a cow at a trestle and derailing crashed into a line of freight cars standing on an adjoining track. Six cars were thrown off the track and left hanging partly off the trestle.

12th, on Valley Railroad (Ohio) the engine and several cars of a freight were derailed by a projecting timber at a bridge undergoing repairs, and thrown into the creek.

15th, on Galveston, Harrisburg & San Antonio, near Martha, Tex., freight derailed by a washout, wrecking a number of cars.

22d, p. m., on Pennsylvania, near Stiffler, Pa., the engine of a mixed train ran over some cows and was derailed, going over an embankment after running on the ties for some distance. The engineer jumped from the engine and landed on the track safe, but a rail which had been torn loose by the engine swung around and killed him. The fireman went down with the engine, and was badly injured.

26th, p. m., on Canada Atlantic, near Eastman's Springs, Ont., a passenger train was derailed at a point where the heat from a forest fire had caused expansion or loosening of the rails. The cars caught fire and were burned up.

UNEXPLAINED.

2d, on Kansas City & Pacific, near Parsons, Kan., several cars of an excursion train derailed, 1 passenger fatally and a number of others slightly injured.

3d, p. m., on Ohio & Mississippi, near Lawrenceburg, Ind., the engine and 12 cars of a freight derailed and went over an embankment, making a bad wreck; engineer and fireman injured.

4th, p. m., on Brooklyn, Bath & West End, in Brooklyn, N. Y., the engine of a passenger train jumped the track at a curve and turned completely over, slightly injuring the engineer.

7th, p. m., on New York, New Haven & Hartford, in Naugatuck, Conn., a locomotive was derailed and badly wrecked.

10th, a. m., on Baltimore & Ohio, at Timberville, Va., a passsenger train derailed.

13th, p. m., on New York, Lake Erie & Western, near Elmira, N. Y., several cars of a passenger train derailed and damaged.

14th, a. m., on Central Massachusetts, in Coldbrook, Mass., a freight train derailed.

14th, p. m., on Pennsylvania road, in Pittsburgh, Pa., a sleeping car was derailed at a switch and thrown crosswise of the main tracks, blocking them for nearly two hours.

15th, a. m., on Danbury & Norwalk, in South Norwalk, Ct., a freight train derailed, injuring a brakeman fatally.

15th, on Duluth, South Shore & Atlantic, at Dollarsville, Minn., freight train derailed.

15th, night, on Arkansas & Louisiana, near Washington, Ark., engine and several cars of a passenger train derailed and damaged, injuring a trainman and a passenger.

25th, p. m., on New York, Lake Erie & Western, near Chamois, N. Y., 4 cars of a freight derailed.

26th, morning, on St. Louis, Iron Mountain & Southern, near Walnut Ridge, Ark., a passenger train derailed.

29th, early, on Fitchburgh road, at Shirley, Mass., 18 cars of a freight derailed, killing a brakeman.

29th, p. m., on Pennsylvania road, in Philadelphia, Pa., 5 cars of a freight derailed and damaged.

OTHER ACCIDENTS.

3d, night, Denver & Rio Grande, near Apishapa, Colo., a piledriver caught on a telegraph wire, killing one laborer and injuring another.

6th, on Houston & Texas Central, near Sherman, Tex., a passenger engine exploded its boiler and was badly wrecked, as was also the tender and baggage car, the force of the explosion apparently having been backward. Engineer killed, fireman fatally injured.

8th, p. m., on Connecticut River road, near North Hatfield, Mass., the engine of a passenger train broke a connecting rod while running at high speed, the loose end demolishing the cab and tearing a hole in the boiler. Engineer and fireman were slightly scalded by escaping steam.

22d, on International road, near Causpascial, Que., the baggage car of a passenger train caught fire and burned up. The only cause assigned for the fire is the explosion of a lamp.

Standard Highway Bridges on the New York, New Haven & Hartford Railroad.

The accompanying drawings show two types of highway bridges built by the New York, New Haven & Hartford. The principal difference lies in the fact that one is provided with sidewalks and one is a plate girder, while the other is a truss. In both cases the upper chords are curved or bowed. The floor beams are similar in both cases. The sidewalks are carried by brackets riveted to the ends of the floor beams. The dimensions of the main parts are given in the drawings.

The Use of the Water Jet for Increasing Adhesion in Locomotives.

One of the questions submitted to railroad companies by the International Commission of the Congress of Railroads, was as to the question of the use of a jet of water or steam to increase the adhesion of locomotive wheels. The companies have submitted answers to this question, which are published in the *Bulletin* of the Commission. The Mediterranean Railroad, of Italy, submitted an elaborate report by Chevalier J. Silvola, stating that experiments were begun in 1879 on the Pontedecimo-Busalla line, which were so successful that the water jet was applied to 35 eight-coupled locomotives used on the heavy grades of that line. This resulted in a considerable saving, the expenditure for sand having been $4,000 a year, while the cost of the steam or water jet was only about $500. An incidental advantage was the absence of the sand, which at one time proved a serious obstacle in the way of maintaining good drainage in the Giovi Tunnel.

The further opinion is advanced that, while the adhesion is not increased quite so much by the use of water as of sand, the water jet system has the advantage in that it does not interpose any resistance to the movement of the train, as does the sand, more or less of which remains on the rails. The engine drivers much prefer the water jet system, as they say it makes the train lighter—that is, it draws more easily. It is stated also that the abandonment of the use of sand is accompanied by a lessening of the wear of rails. This result is supported by numerous observations, and is further corroborated by the observations of M. Couard on the Sorderettes Tunnel of the Paris, Lyons & Mediterranean Railroad, and those of M. Egger on the Swiss Central Railroad. The water-jet system, it has been said, will not answer in cold climates, but it has been very successful on the Swiss Central and Gothard lines, both of which are subject to very low temperatures. The Gothard railroad has 55 locomotives fitted with the water-jet and thoroughly approves the system. On this road, although there are long tunnels and steep grades, making the use of heavy locomotives necessary, the wear of the rails has been much lighter than was expected. The results so far obtained justify the making of extended experiments with the water-jet system in the opinion of the commission.

Polytechnic Section of the American Institute.

At the first meeting of the Polytechnic Section, Oct. 13, President Grimshaw called the attention of the members and others present to the fact that the work of the section during the coming year would be more aggressive than ever during the past year. The methods proposed by the section for its work in the near future is by exchange of information among well posted men, rather than merely giving lectures and reading papers. Since July, 54 technical papers have been added to the reading-room, making the entire number now regularly received 88. The president took pleasure in announcing that there were applications for membership from nearly 30 engineers and others interested in the industrial arts, some of them holding very prominent positions.

A most important work of the section during the coming year will be the investigation of the cause of fire in theatres and other public buildings, and the best means of their prevention and extinguishment.

A paper on "The Transportation Problem," by E. B. Meatyard, C. E., of Wisconsin, was then read, the author calling attention to the fact that freight rates averaged a trifle over 1¼ cents per ton per mile, and showing what were the main factors in creating the large expense account. Among other novel and surprising items, he argued in favor of rails weighing 125 lbs. per yard upon stiff ties five feet apart, instead of 80-lb. rails on ties only 21 in. apart, as at present. Another cause was excessive grades upon trunk lines, caused by trying to shorten the distance. The author claimed that engine driver loads were one-third too heavy, rails not heavy enough and of bad form; for while they bend readily when they rest upon a stone, there is nothing in their web to cushion the impact of a rapidly moving rigid wheel. Freight cars weigh twice as much per ton of their capacity as they should. There is no reason why the carrying capacity of cars should not be increased. If engine drivers carry five tons each, there is no reason why car wheels should not.

The Westinghouse Heater.

The Westinghouse car heater and derailment brake were tested before the New York state Railroad Commissioners on the 26th inst., at the Grand Central Depot, New York.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

It will be remembered that it was suggested last May that a proper supplement to the Burlington brake tests would be the running of a train a long distance, with varying conditions of grade, track and weather. Something of that kind the Westinghouse Company has now undertaken with its peripatetic school of braking. The journeys of its 50-car train, fitted with its latest improvements, seem to be something in the nature of a triumphal progress, or, at least, will pass as one until some competitor can make a more brilliant showing. The aim in these last illustrations of the efficiency of the air brake seems to have been to use it under actual working conditions as to leverage and pressure rather than to make the quickest possible stops. At the tests at Como (near St. Paul) emergency stops down a grade of about 31 ft. were made in 172 ft. at 19 miles an hour, in 200 ft. at 20¼ miles, 490 ft. at 36 miles, and 583 ft. at 37 miles. At Chicago on level track the stops were 164 ft. at 20 miles, 184 at 22 miles, 469 at 40 and 487 at 37 miles an hour. These were with a 50-car train empty. With a 20-car train the stops at Como were 109 ft. at 20 miles and 327 at 37 miles, at Chicago they were 120 ft. at 20 miles and 272 at 33 miles. The reports received show that there were no injurious shocks, and with the 50-car train no skidding. With the 20-car train greater leverage was used and the wheels were skidded, more or less. The time required for complete application of the brakes on the 50-car train is stated as before as two seconds and the time of release at the thirty-fifth car, 25 seconds. These results are of the greatest importance as showing that trains can make such stops without shock and without the aid of electricity, but they only confirm the knowledge gained in the recent private trials at Burlington. They have been seen, however, by a great number of people, and will carry conviction. One most remarkable episode of the journey to St. Louis was a stop not in any programme. The train was flagged while going 52 miles an hour on a 63-ft. grade, and was stopped in less than half its length; that is, in less than 950 ft. The train comes east by Cincinnati, Cleveland and Buffalo, and later will go south. It will be surprising if at the end of its wanderings the sum of human knowledge about air brakes is not a good deal increased.

The Trunk Line Executive Committee has recommended the adoption by the Trunk Lines and their western connections of a tariff of through rates on grain, provisions and other staples from Chicago to European ports, the same rates to apply either through Boston, New York, Philadelphia or Baltimore. This means of course that the roads will guarantee the ocean rate, thus taking the risk of the great fluctuations in it, though there is nothing under present conditions to hinder the raising or lowering of the through price every day if need be. A tariff is of no great advantage unless published; and if published it would seem that it must not be changed, at least not increased, without a ten days' notice.

The recent low rates on grain through from the West to British ports, which the companies in their strife for business reduced, it was said, below the rate to the seaboard, provoked action among the New York exporters, who started to complain to the Interstate Commission, though whether they presented their grievance does not appear. It is, however, quite certain that irregularities, if continued, will be brought before the Commission in some shape. Though it is not illegal for a Chicago-New York railroad to accept, say, 18 cents out of a 25 cent. Chicago-Liverpool rate, while charging 25 cents on the same commodity to New York for home consumption, there will doubtless be those who will be ready to enter a complaint if only to "keep up the excitement." And, if once the matter comes before the commissioners it will be nothing strange if they order the rates regularly published, thus bringing in the ten-day interval to hamper all changes. It is, therefore, difficult to see how the present action is likely to clear up matters much. The roads which do no cutting may find it somewhat easier to detect their neighbors' sharp practices, or rather may be able to make out a *prima facie* case against them with less trouble than heretofore; but as in so many previous instances, it is to be feared that the manner rather than the degree of the crookedness will be changed.

The Roadmasters' Convention.

The results of the convention of the Roadmasters' Association are not what we had hoped or what should be expected from such a body of men. The reports adopted were not in all cases very specific, and the information brought out in the discussions was very little. From a body of men like the roadmasters, men of intelligence and force of character, and men with extraordinary chances for observation, there should come many valuable facts and suggestions. To those who were there and interchanged experiences in talks with their fellow-members, the convention was doubtless very profitable. Indeed, this is perhaps the chief good of most conventions of this sort; but the published record is meagre in results. The disinclination to write and talk which the roadmasters show is in itself no fault. Verbosity is not knowledge, by a good deal; but it may be suspected that the men in this last convention were comparatively fruitless, not so much from abundance of knowledge, but rather because of lack of the habit of arranging and telling what they know. To see is one thing; to know exactly what to see, how to record it and compare it with other men's observations, and how to present knowledge so that conclusions can be drawn, are the highest results of scientific training, and, as a rule, the training of the roadmasters has not been such as to make them experts in the arts of observing and presenting facts. The question comes up, therefore, if the superior officers of the railroads do what they should in bringing out the scientific side of the roadmaster's occcupation. Much might be done in this way in laying out systematic schemes of observation and record, so that the roadmasters could go into their conventions with accurate and convincing data rather than with impressions. They should be pre-eminently recorders of *facts*. To their conventions we should look with increasing confidence from year to year for plain stories of actual things. Mr. Charles Latimer in times past has done much to awaken his roadmasters to thoughtfulness in the performance of their duties, but his example has been little followed. What is wanted, however, is not only inspiration to a sense of duty and responsibility, and quickening of intelligence, but specific instructions in observation and record. The whole discussion in the Cleveland Convention showed want of preparation, and the opinions presented carried weight because of the men who put them forward, and not because of the exact facts behind them, notwithstanding that the roadmasters have a magnificent chance to accumulate original data. When they took up the subject of standard rail sections, for instance, it is not likely that it was with any great hope of definitely settling the matter; but doubtless they thought, as they had a right to, that they could contribute something of value toward a settlement. The report of their rail committee and the discussion that followed ought to have been loaded with material of use to the engineers who are studying the problem, and it is largely the fault of the engineers and general managers that they were not. That is, it is for these officers to designate to their subordinate roadmasters the essential matters to record and report.

The report on standard rails means almost nothing. "Nothing less than a 60-lb. rail" is recommended for "main trunk lines," with heavy tonnage, high speed and good ballast, and an increase of 15 per cent. is recommended for lines of similar traffic not ballasted. A less weight may be used on roads of lighter tonnage. In treating of "form" and "structure" the report reminds one of the subtle political platforms of these degenerate days, in which the saloon-keeper, the prohibitionist, the free-trader and the protectionist are all expected to find hope and comfort. To most of the Western and Northwestern members the increase in weight recommended will seem substantial, and with the provision for 15 per cent. additional weight, when the track is not well ballasted, it is substantial. A 56-lb. rail is probably that to which far the greater part of them are used. The weight of opinion in the discussion favored rails of 70 to 90 lbs. One number objected to a heavy rail as difficult to tamp, and another, from the Chicago, Milwaukee & St. Paul, said that the 67 lb. rail was not giving good satisfaction because the head was too soft. One other speaker found a similar objection to rails heavier than 50 or 56 lbs. One speaker stated that the economy or maintenance of a 60-lb. rail over one of 50 pounds per yard was sufficient to pay interest and deterioration on the cost of the extra 10 lbs., not to mention the great gain in economy to rolling stock and the added comfort to passengers. The other arguments were less specific; but, as has been said, the weight of opinion among the speakers was for a rail a good deal heavier than that recommended in the report as adopted.

The action of the convention on the question of a standard guard rail at frogs will doubtless tend to do away with some bad designs still in use. The standard recommended gives two inches flange-way, with no filling, and has five feet straight in the middle and five feet curved at either end, giving six inches opening at the entrance. A brace of five-eighths iron is recommended instead of the old form of cast-iron brace. This substitution is made to take stumbling-blocks out of the track, and if any one knows the advantages of filling and the disadvantages of stumbling blocks it must be the roadmasters. The feature of this standard which seems open to criticism is the length of the straight portion. Ten feet would be better than five. Indeed, the President of the Association was of the opinion that the guard rail should run the whole length of the track. One who does not go to that extreme will still admit that the chances are that a truck will go more smoothly and safely over a frog if the guard rail is long enough to take in both wheels and bring them to a steady motion before the frog is reached.

The effort of the Committee on Standard Frogs to recommit the Association to a rigid frog, for all places, was promptly and properly defeated and a report was adopted in favor of spring rail frog for main track whenever practicable.

The Association recommended the use of the Latimer-Childs bridge guard and rerailing device, with a guard rail the whole length of the bridge, to be placed inside the main rail, and not less than two inches, nor more than eight from it. On this there was little discussion, and no opposition was developed. Such testimony as was presented in the discussion went to confirm what we already know, that there are on record enough instances in which cars have been rerailed by the use of the Latimer apparatus to leave no excuse for neglect to provide bridges with a safeguard so simple, cheap and effective. The roadmasters, at least, may have the satisfaction of a duty done in this recommendation, and their influence will surely have weight in spreading the use of this or some similar appliance.

The question of a standard rail-joint was again laid over without action. The joint recommended by the committee was the Fritz-Sayre, of the Lehigh Valley. Wisely enough the roadmasters concluded that this vexed question is not yet to be answered. A general solution, or anything like a general solution, of the joint problem cannot be looked for at present. It is so far away, in fact, that it cannot be said that even the best *type* of joint is to-day in large use (comparatively speaking), let alone anything like agreement on the best form and use of the most common type.

On the whole the roadmasters are to be congratulated on the success and the spirit of their organization, which is yet young. If we have seemed to find fault with what they have not done it is because we recognize the immense importance of their duties and appreciate their opportunities and expect much from them.

Continuous Heating.

The advantages of the continuous principle of heating cars appear now to be very generally appreciated, and while the increased safety gained by the use of low pressure steam or hot water in place of cast-iron stoves is self evident, and cannot be denied, it is

also certain that the economy and more equable heat obtained are further powerful incentives in inducing railroad companies to replace stoves with one of the numerous systems of continuous steam heating now in the market and undergoing practical test.

One or two points in this question deserve special consideration. The adoption of a universal form of coupling is very necessary to secure the general adoption of this principle of heating, and enable sleepers and through cars to be run over connecting roads. It is gratifying to note that some action has been taken by the Western Railroad Club to secure this desirable end, and it is to be hoped that railroads, sleeping car companies and the inventors of the various systems of continuous heating will work heartily together for an object which will ultimately benefit them all, and do much to facilitate the universal adoption of a safe principle of heating cars. While it seems highly desirable that the different and rival systems of continuous heating should be thoroughly tried, a common system of coupling for the steam pipes is as necessary as interchangeable car sleepers.

A good system of heating which gives an abundant amount of heat affords an excellent opportunity to improve the ventilation of cars, which in the winter, when windows are kept closed and doors only opened for a minimum space of time, is often very defective. As a large amount of steam will pass through a very small opening it is in practice difficult to regulate the temperature by the amount of opening of the steam supply valve in a system of steam heating. A more feasible method is to regulate the amount of fresh air admitted. If this air is distributed and directed so as to strike on the steam pipe in small jets and become warmed before being admitted into the car, no disagreeable effect or cold draft will be felt, and the benefit of fresh air at a comfortable temperature will be obtained. Unfortunately, few inventors seem to recognize that heating and ventilation should go hand in hand, but it is to be hoped the present opportunity for a material improvement in the ventilation of railroad cars will be properly utilized and such a serious source of discomfort, ill health and death as foul air will be swept away by the current of fresh air which the improved system of heating render possible.

Many systems of ventilation depend wholly or in great part upon the movement of the train, and are thus defective in principle and unequal in action, giving a strong draft when the wind is blowing hard or the train running fast, and becoming inoperative and permitting stagnation when the car is standing still. Any constant supply of heat will, however, produce a constant upward current of air, and as the heat from steam pipes can be tolerably equally distributed throughout a car, it follows that steam heating renders possible a constant and equable circulation of air throughout the car, and that it is practically possible to make the ventilation independent of the speed of the train and tolerably equal in all parts of the car. These are great benefits which cannot be attained by the use of a common stove, and it is to be hoped that the inventors of the different systems of continuous heating will see that their systems are so devised that their capacity for ventilation is fully utilized.

Any idea that the law in New York state prohibiting the use of stoves is unconstitutional cannot be allowed to stand in the way of a great reform. People can not be burned to death because a lawyer considers cremation strictly legal. It is, however, gratifying to observe that the movement to abolish stoves seems general all over the country, and that no railroad company has seen fit to resist the introduction of a safer, cheaper and better method of heating on the ground of a legal quibble.

The objections to any method of encasing stoves in an iron safe or providing a water tank to extinguish fire in the event of a collision are obvious. A safe would shut off the heat of the stove and prevent it ever reaching the passengers, and any self-closing door, etc., would probably be wedged fast with dirt and rust, long before its one opportunity of usefulness arrived. The lesson that safety devices to be of any utility must be kept in constant use is well known, and practical railroad men do not need to be reminded of the fact.

The Railroad Officers' Associations.

A valued correspondent writes us deploring the lack of co-operation between the different deliberative bodies of railroad men and criticising the Superintendents' Association for laying out such a broad field for discussion at its next meeting. The 25 subjects propounded by the Roadway Committee can readily be made to fill five or a dozen meetings as well as one, and, moreover, many of them can with advantage be handed over to the Roadmasters,' or other associations for digestion and clarification before being allowed to occupy the time of the superintendents. Our correspondent adds:

> Why should not our associations be governed by the rules governing courts of law? Let the Roadmasters,' the Car-Builders' or the Master Mechanics' Association be the first or lower court to discuss subjects, then pass them on to the next higher court, the Superintendents' Association, to be passed upon by them, and in turn handed over to the Supreme Court, the General Managers' Association (the Time Convention), where final action can be taken. By this method of procedure the different subjects will be fully discussed and passed upon by the subordinate officials in the order of their authority; and on reaching the higher court (the General Managers), with all papers bearing on the subject, a decision can be rendered which will govern all the roads interested in adopting a standard.

These suggestions are sensible and well founded, and come from a practical man; but the obstacles to carrying them out are many and great, and the consequence is that they are generally given up as hopeless by those who, like our correspondent, have given the matter attention. In the first place the Time Convention has never set itself up as a General Managers' Association, and scarcely admits that it is a deliberative body at all. The valuable discussion and action on train rules came about almost by accident, as it were; and a large share of the members seemed to grudge the time spent in the discussions, apparently desiring to have the Committee do all the thinking as well as all the work. Many of the members of the Time Convention are officers of the passenger department, and take little interest in operating questions. Many are superintendents; shall they be relegated to the Superintendents' Association?

The Superintendents' Association is wholly individual and voluntary, and in no sense official, and so has no standing in the Time Convention except by courtesy. Doubtless many of the members feel a delicacy on this point which deters them from taking action. Many of the superintendents are comparatively young men, having charge of divisions only, and so might be regarded by some master car-builders, roadmasters and master mechanics as not superior to themselves, or proper officers to constitute a "higher court" to be looked up to.

The gentlemen who propounded such a comprehensive list of questions for the superintendents to discuss doubtless were guided by their experience, which teaches them that a very large share of the subjects are likely to be laid on the table or evaded in some way, or at least to be disposed of in such a summary manner that very little time will be consumed. With men so unused to talking and to giving reasons for the faith that is in them, it is largely by good luck (or good wit) that anything deserving the name of discussion is elicited, and it is therefore well to have a variety of subjects in reserve, so that the difficulty can be met on more than one side. None of the associations under consideration have any authority; even the important and weighty action of the Master Car-Builders on couplers and of the Time Convention on train management being binding on no one and subject to any modification in practice that anybody sees fit to make. This detracts largely from the interest which would otherwise attend the reference of questions by one association to another.

Notwithstanding these mountains in the way, a path ought to be cleared and the scheme of our correspondent carried out. Not a great deal, perhaps, could be learned from the more talkative Germans or from the European railroad congress concerning organization or conduct of conferences, but they are certainly ahead of us in some respects. The car accountants have set a good example in one way. Realizing the lack of authority in their organization, some of them took pains to get the views of their general managers, and urged the necessity of this being done by all. In this way the interest of the general managers is enlisted, and by persistence they might be brought to give more careful attention to what their subordinates are thinking about. Most of them have such a multiplicity of subjects weighing on their minds that they give comparatively superficial attention to what their subordinates are supposed to have digested. If the latter wish to get them to take a lively interest in questions brought up they must contrive to get more of the managers' time; and if they cannot reach them collectively, each roadmaster, master mechanic, car accountant and master car-builder must work on his own manager individually. The master car-builders, in securing recognition of the representative membership idea, have scored one point in this direction.

Overcrowding on the Elevated Roads.

The chronic overcrowding of the elevated railroads of New York has lately called forth some indignant protests from the daily press. It cannot be denied that a corporation which obtained gratis the most valuable site in the world for a railroad should show some consideration to the 400,000 passengers it conveys daily. A passenger on any other railroad can at least obtain a seat, and grumbles very justly if many further comforts are withheld, but during the winter months, for several hours of the day, it is difficult to obtain even room to stand on an elevated train. Some amount of overcrowding is excusable where the cause is exceptional and can be with difficulty foreseen or provided against. This excuse cannot be alleged on behalf of the Manhattan, for few lines possess a traffic the amount and nature of which can be foretold with greater certainty. The number of passengers carried in each direction can be calculated beforehand with tolerable accuracy for every hour in the year, and the ebb and flow of traffic follows certain laws with as much certainty as the tides. It is manifestly the primary duty of any railroad to provide reasonable accommodation for their customers, and the obligation is enhanced when the custom is regular.

When, however, day after day passengers are literally wedged into cars until the aisles and platforms are impassable and the gates can with difficulty be closed, it is evident that some change must be made. The spectacle often witnessed of thirteen, fourteen and even a greater number of ladies standing in one car and endeavoring to grasp straps far above their heads while the cars are swinging round the sharp curves of the elevated, is one which cannot be seen in any other country and is a special disgrace to our civilization, which we boast treats the gentler sex with greater respect and deference than elsewhere.

The elevated railroads have been a most profitable speculation to their present owners, who should certainly in return afford better accommodations to their patrons. If the present elevated railroads cannot find a remedy, it must be evidently found in the common solution of such a problem, a competitor. All prosperous undertakings which refuse reasonable accommodation have ultimately to be brought to their senses by competition. This is a law of nature, and affects railroads, as much as any other business.

The proprietors of the elevated roads cannot, however, fail to see the danger of competition and the problem of the best manner of improving their facilities has doubtless engaged their serious attention. The subject is not an easy one, and when such an immense and fast increasing traffic has to be dealt with, the additional and absolutely necessary facilities will undoubtedly entail a large expenditure. The game, however, appears worth the candle, and the Manhattan cannot expect to go on indefinitely carrying the greatest traffic in the world by means of exceptionally small trains running on a light iron viaduct.

The daily press has urged that the number of trains be increased, and suggest that they should be run at one minute intervals. This would mean sixty trains per hour, following one another on the same track. It is not surprising that observations show that the number of trains during the busiest time does not reach this figure. Some slight delay at stations, junctions, curves, coaling places and switches, is inevitable, and where the margin between trains is only 60 seconds, a very small delay means either an accident or a block of traffic. To insure safe and regular running an interval of two minutes is required, and on lines, where the block system and interlocking are strictly carried out, twenty-four trains per hour has been found the maximum number that can be regularly worked. It is manifest that an insufficient interval of time means danger, especially in fogs. The trains on the elevated are already run too close for safety or regularity of running. The inevitable collisions every foggy day, and the very irregular interval between the trains attest the truth of these statements.

The remedy must be sought elsewhere. There must be more tracks in the crowded parts of the line or heavier trains. The suburban traffic in Chicago is small as compared with that on the elevated, but the Illinois Central trains seat from two to three times the number of passengers that can be properly accommodated in the longest train run on the Manhattan. The trains on the underground railways of London seat over 400 passengers, and on many of the elevated or daylight lines the trains are regularly composed of 15 vehicles, seating over 600 passengers. As a five-car train on the elevated seats only 240 passengers, the reason for the overcrowding is apparent.

But the substructure and stations are built for small trains, and the present process of strengthening the existing structure must soon reach its limit, while public protests and legal obstruction follow every attempt to increase the tracks or platforms. The situation is a perplexing one, but it must shortly be escaped from in some way. The over-

crowding will, from the increase of traffic steadily grow worse unless some radical change is made; and apparently this change may take one of two forms. Either a first-class and, if possible, four-track railroad may be built by some parallel routes, or the present Third and Sixth avenue lines may be practically rebuilt, and made amply strong enough to carry trains of sufficient capacity to seat the passengers.

September Accidents.

Our record of train accidents in September, given in this issue, includes 83 collisions, 63 derailments and 4 other accidents; a total of 150 accidents, in which 61 persons were killed and 191 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear	37	
Butting	43	
Crossing	3	
		— 83
DERAILMENTS:		
Broken rail	2	
Spread rails	1	
Defective switch	3	
Broken frog	1	
Broken bridge	2	
Bad track	2	
Broken wheel	5	
Broken axle	6	
Fall of brake beam	1	
Broken truck	2	
Failure of brakes	2	
Misplaced switch	6	
Runaway train	1	
Bad switching	2	
Open draw	1	
Cattle on track	3	
Washout	1	
Accidental obstruction	4	
Malicious obstruction	2	
Sleepers burned by forest fire	1	
Unexplained	15	
		— 63
OTHER ACCIDENTS:		
Car burned while running	1	
Broken connecting rod	1	
Boiler explosion	1	
Others	1	
		— 4
Total number of accidents		150

The causes of collisions where given were as follows:

	Rear.	Butting.	Crossing.	Total.
Trains breaking in two	6	..	..	6
Misplaced switch	1	5	..	6
Failure to give or observe signal	4	..	..	4
Mistake in giving or understanding orders	..	11	..	11
Failure of power brake	..	1	..	1
Miscellaneous	4	2	..	6
Unexplained	22	24	3	49
Total	37	43	3	83

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	..	11	..	11	7
Defects of equipment	7	16	2	25	17
Negligence in operating	21	10	1	32	21
Unforeseen obstructions	..	11	..	11	7
Miscellaneous	6	..	1	7	5
Unexplained	49	15	..	64	43
Total	83	63	4	150	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger	41	22	3	66	29
Freight and other	119	41	1	161	71
Total	160	63	4	227	100

The casualties may be divided as follows:

KILLED:	Collisions.	Derailments.	Other.	Total.	P. c.
Employés	35	14	3	52	85
Passengers	2	1	..	3	5
Others	3	3	..	6	10
Total	40	18	3	61	100
INJURED:					
Employés	53	75	3	131	69
Passengers	41	18	..	59	31
Others	1	..	..	1	..
Total	95	93	3	191	100

Forty-one accidents caused the death of one or more persons and 38 caused injury, but not death, leaving 71 (47 per cent. of the whole) which caused no personal injury worthy of note. Three accidents caused the death of one or more passengers each, and 15 involved injury to passengers.

The comparison with September, 1886, shows:

	1887.	1886.
Rear collisions	37	38
Butting "	43	17
Crossing "	3	3
Derailments	63	69
Other accidents	4	8
Total "	150	135
Employés killed	52	21
Others "	9	21
Employés injured	131	68
Others "	60	80
Pass. trains involved	66	50
Average per day:		
Accidents	5.00	4.50
Killed	2.03	1.40
Injured	6.37	4.93
Average per accident:		
Killed	0.407	0.311
Injured	1.273	1.096

The number of persons killed was not exceeded even by the records of this exceptional year, except in July and August; and, as we remarked two months ago, the first named of those two was a very bad month. The number of accidents this month is the largest since February, 1885, when cold and snow were severe, and there were 216 accidents in all, 79 of them being noted under the heads of broken rail, broken wheel, snow and ice and broken parallel rod; ten of them being included in the last named. September, a year ago, had the Silver Creek collision, but even with that had only about two-thirds as many killed as we now record.

About every month we have to record the killing or maiming of passengers, stock drovers, invited companions or other persons legally riding on cabooses or engines, which emphasizes the fact that the "other" persons included with passengers are not all trespassers by any means. Many superintendents apparently could with profit take lessons from those who are exceedingly cautious about allowing passengers or guests on anything but passenger trains.

Included in the number of employés injured this month are 63, which it should be recollected are not trainmen proper; two officers' trains met with mishaps and their occupants received object lessons in a very practical department of railroading, and in Colorado a work train was derailed, apparently by gross carelessness, and 61 laborers were injured, beside four being killed. Perhaps the number is exaggerated, though the tenor of the accounts of some accidents to work trains gives the impression that too little rather than too much stress is laid upon them. Conductors and enginemen who are thoughtless of human life except when restrained by the rigid rules of passenger train service are more common than they ought to be. One of the rear collisions was between a "fast stock train" and an ordinary freight, which suggests the query whether in accelerating freight train speed it is always borne in mind that an additional class of trains is really being made, and that therefore increased vigilance is called for. Many rear collisions have doubtless been averted simply because trainmen judged others by themselves, and thus formed a correct estimate of the speed of the train next behind them, without much regard to the rule or their duty under it. A train running faster than themselves, however, spoils this reckoning and throws upon the management the duty of prescribing the conditions, as has been done concerning passenger trains. Many accidents to freight trains come from running too fast, and the large numbers of them in all past years have been tolerable largely because the speed was generally low enough to admit of men jumping off and escaping serious injury. Heavy freight trains with a crew of the ordinary size are really out of the control of the men for a considerable share of their time on the road, even at 15 miles an hour, and increasing this rate to 20 or 25 miles while still depending upon the hand-brakes is a risky proceeding.

Cylinder Condensation.

Our contemporary, *Engineering*, publishes portions of a paper recently read before the Institution of Mechanical Engineers, London, upon Cylinder Condensation, by Major English. The experiments described were designed to directly measure the condensation taking place in a steam cylinder.

The connecting-rod was disconnected and the piston blocked at the end of stroke furthest from crank. The interior of the cylinder was blocked up solid with wood and iron packing, and the steam passage at the crank end of cylinder was also blocked up and further closed by a brass plate scraped down to the valve seat level. There was thus only left open the back end steam passage and cylinder clearance, and this was alternately filled and emptied of steam to a surface condenser by causing the crank shaft with eccentric to be revolved by a belt from an independent engine, the valve of the experimental cylinder being set at a cut-off of $\frac{7}{10}$ ths. or thereabouts. The water accounted for by the surface condenser being compared with that properly due to so many fillings of the clearance spaces is then supposed to show us something of initial condensation under actual working conditions.

The absurdity of the process is apparent but the experiments are useful, as showing on the one hand the rate of condensation of a certain weight or area of cast iron in a certain time, and may be of service to steam heating engineers; and on the other hand as showing how very great in fact is the ignorance which prevails upon the subject of cylinder condensation, even amongst engineers of standing; for there is hardly room to doubt that the condensation shown by the Major's little steam trap would be very different if conducted with steam doing work by expansion and depositing moisture upon cylinder sides to be swept off during exhaust, if not previously re-evaporated.

It is probable that very little re-evaporation takes place in a working cylinder during expansion. It is during the exhaust stroke that the bulk of re-evaporation takes place and the benefits which would accrue from cutting off the condenser, as has been suggested, as soon as the steam has left the cylinder are prevented by the fact that after shutting off the condenser the re evaporation would continue just the same and cause so great a rise of the compression curve of the indicator diagram as to seriously cripple the power of the engine.

Major English's experiments have no ground of comparison with practical working further than the mere coincidence of being made with an apparatus rigged up of parts of a steam engine. Any simple cast-iron vessel of more easily determined form, area, etc., would have been far better as an apparatus for determining radiation from iron surfaces, which is all that the experiment can be said to show. The rates of condensation of steam by metal surfaces are pretty well known to marine engineers, for example, or to makers of steam-heating apparatus. The loss by radiation in a steam engine is quite an indeterminate quantity. The difference between the weight of steam consumed by a well-clothed cylinder and the same cylinder bare may be accurately determined, it is true, but it must not therefore be assumed that the loss is due to radiation entirely, for in working an engine with unclothed cylinder there is not merely a loss due to radiation, but a further loss connected with and dependent upon the little many causes and effects of internal cylinder condensation, which may be increased seriously by the little additional condensation from radiation, and these secondary effects of an unclothed cylinder in no way represent the simple primary and direct loss which is so caused.

The experiments alluded to cannot do more than show the primary loss due to unclothed cylinders. The fact that the condensation per square foot of clearance surface was greater with the non-condensing series than when the condenser was employed, appears to support our views as to the inutility of the experiment generally as a steam engine test; for had the test been with a working engine, we should have expected to find the influence of the condenser as a cooler-off of cylinder walls something considerable, whereas it was less effective than the plain atmosphere with a less range of temperature.

A very thorough inspection of certain of the Pacific railroads has just been completed by Mr. R. P. Morgan, Jr., of Illinois, acting as inspecting engineer for the United States Pacific Railway Commission. The inspection was begun at Council Bluffs May 27, and concluded Sept. 16. It covered the entire Union Pacific system, that of the Central Pacific and other California roads, the Colorado narrow-gauge roads and the Sioux City & Pacific. The inspection was designed to obtain the data for a report on the physical condition and the material of the roads, and on their earning capacity, and the inspectors have accumulated such a body of facts that they can give a fair actual valuation of the properties and an estimate of the cost of reproducing them as they stand to-day. The inspection was made by Mr. Morgan, Mr. William L. Elseffer and two assistants. They were provided with a special train, consisting of a locomotive and baggage car and a joint commissary and observation car. The train was moved over the roads at varying speeds, averaging about 12 miles an hour. A stop was made every five miles, and at each five mile point measurements and data were noted covering the formation, gradients, right of way, alignment, material in excavation or embankment, and a thorough description of the track was obtained, including all possible particulars of the ties, rails and joints. Additional notes were taken from the moving train by which to estimate the quantities, also notes of the condition of the road and structures. Of course the train was stopped at other points where there was work of a special character The contractor's measurements were checked up very frequently. The division roadmasters accompanied the train over their respective divisions, and from them much accurate local information was obtained as to qualities and life of timber used for ties or structures, local prices of labor, sources of fuel and water supply, the dates when steel rails were substituted for iron, etc. At terminal points, division shops and intermediate stations a careful inspection was made of the rolling stock, stationary power, machinery and tools, and the statements and schedules furnished by the companies verified. Much material of high technical interest has been gathered in this inspection, notably as to the life of ties, structural timber and rails. The report will soon be presented to the Commission, and should be made available to the public without delay. Its use to the Commission and to the government will be in getting at the basis for a just and reasonable settlement with the land grant roads, but it will be a pity if such a body of knowledge is long buried in the unsearchable archives at Washington.

President Adams, of the Union Pacific, was seen by a correspondent of the *Railroad Gazette* at his office in Boston last Wednesday, and in reply to queries, said that there is no truth in the published reports that the Union Pacific contemplates an extension from Omaha to Chicago; nor is there any basis for the report that the Union Pacific intends selling or leasing its Kansas Pacific Division to the Chicago, Milwaukee & St. Paul. That is one of the most valued feeders of the Union Pacific, and the company would almost as soon think of parting with the main line. There is no objection to making a lease of the entire Union Pacific property, but there is no inteneion of taking away any of its best extensions. If the government will only make proper arrangements with the Union Pacific, the way will be clear enough for the road. Of course, there should be large expenditures toward maintenance of way, for additional equipment and for needed extensions, etc., but until Congress outlines its policy little can be done or foretold pertaining to the future of the road. Mr. Adams said he did not expect to visit the West again till spring, being very well content with the management of affairs there by Vice-President Potter, who is esteemed very highly by the Union Pacific management.

Referring to the reported Northern Pacific-Union Pacific and allied lines combination, President Adams said that it exists only in newspaper reports. There were legal obstacles that stood in the way of such an arrangement, even if it were the disposition to perfect it. He said that the Oregon Short Line lease is entirely satisfactory to the Union Pacific, but it is a mistake to assume that the Union Pacific is attempting to force its Pacific Coast business by that route. There is no basis for reports of strained feelings between the Union Pacific and Central Pacific; the two roads are working in perfect harmony, and the bulk of the through business of the Union Pacific is delivered to the Central Pacific.

Asked about the reported prospective "war of rates" on Pacific Coast passenger business and the contemplated $20 rate from Missouri River points to the Pacific, Mr. Adams said that he knew of nothing to warrant such an idea. He had no advices from Mr. Potter that would lead him to anticipate any serious trouble over transcontinental business.

Mr. Adams expressed much interest in the efforts of the Inter-state Commerce Commission to further a uniform system for making reports by the roads to the different state commissioners and to the Inter-state Commerce Commission. If all the commissioners would unite upon one form, and if a date could be agreed on when all reports would begin and end, and the system of comparisons, he arrangement of earnings, expenses, etc., could be

the same throughout the country, it would not only be a great convenience and give a more intelligible conception of the condition and workings of the various roads, but would as well cause a great saving in time and expense. Mr. Adams has given this subject much study and has advocated the idea for years. Its consummation is rendered more probable, now that the Inter-state Commission has taken the matter in hand.

The following statements about the Atchison, Topeka & Sante Fe were made this week by Vice-President Smith to a correspondent of the *Railroad Gazette*. They sum up clearly information about that system which has already appeared in our columns, and dispose of various rumors which we have not published.

It is stated that trains will be running between Kansas City and Chicago by Jan. 1, and good time will be made, although the schedule at the start will not be equal to that of a few months later, when the new roadbed becomes better adapted to the rapid running of trains. No through trains will be run from Chicago to the Pacific coast to begin with, although there will be through Pullman car service. Trains will be run between Kansas City and Chicago. No arrangements have been made for through service from the Atlantic to the Pacific coast. The Atchison has bought a sixth interest in the Western Indiana belt road at Chicago, and will make that depot its eastern terminus. There will be considerable additions to the yards and depots of the Western Indiana in order that the business of the six roads using it may be properly accommodated.

The Atchison has not made any arrangements with Claus Spreckels whereby he is to run his line of steamers from San Diego to San Francisco and thus make a complete Atchison service, from Chicago to San Francisco. The intention is to deliver Atchison passengers at Mojave, Cal. (the Western terminus of the Atlantic & Pacific), to the Southern Pacific. It is possible, however, that Mr. Spreckles may conclude to have his vessels that ply between San Francisco and the Sandwich Islands stop regularly at San Diego, on both outward and return passages. In that event, the Atchison would doubtless run its trains to and from San Diego so as to accord with the arrival and departure of the steamers.

As regards the Colorado Midland, it is an independent road in which the Atchison has a very friendly interest, and its trains are taken over the Atchison tracks to Pueblo. Referring to the report that the Atchison is trying to secure control of the Toledo, St. Louis & Kansas City, Mr. Smith said there was no foundation in it. No negotiations of that sort are pending or contemplated. A large amount of rolling stock is being completed for the Atchison. Most of the coaches are being built at Pullman and Dayton. The report that a contract has been made by the Atchison with the Pullman Company for seven vestibuled trains is incorrect. It is likely that the Atchison will have the Pullman vestibuled train service, but contracts have not yet been signed to that effect. Work on the different extensions of the road is progressing in most satisfactory manner. Everything is being done to assure safety and with the idea of being permanent and first-class. The outlook for the country traversed by the Atchison was never more promising.

The express companies have come before the Inter-state Commission in a very good spirit, and have presented numerous strong arguments tending to show that they are not subject to the "law to regulate commerce." Express business is, indeed, generally carried on by wagon and rail, or wagon and water; and so, as claimed by the companies, is not within the terms of the act; but the claim that no one would ever confound an express package with a freight package cannot be so readily accepted. Fresh flowers, fruit, and various other perishable and fragile things requiring special care are taken as freight, while express companies carry machinery, beer, dry goods and numerous other things that naturally class as freight. The dividing line is not so easily defined. Express and sleeping car companies certainly come very near being common carriers, and in many respects can misuse the public as badly as can a railroad, so that there is no doubt but that Congress *can* regulate them if it chooses to. They are in a broad sense agents of the railroads; the essential part of the service which a sleeping car company does for a passenger is not the furnishing of the car, which is done through the railroad company, but the *care* taken of the passenger; and this is the same in principle as the service rendered by a water boy. An express company's work is the special collection and delivery of goods and the special care of them on the road; and the kind of goods is decided by the amount of care and degree of haste desired by the consignee. Pig iron is express matter if the owner wishes to pay for having it kept under lock and key, guarded by a messenger and carried in a "varnished car;" and live chickens or valuable millinery are suitable *freight* if delay and danger of crushing are provided against.

Mr. Robert Griffen, a well-known statistician, discusses in a recent paper the causes of England's diminished property and infers from a large amount and variety of evidence that there is little to account for. Nevertheless he points out that we may prove too much by figures—"that it is an outrage on common sense to talk of there being no check to the rate of growth in the country when times are notoriously bad and everybody is talking of want of profit."

On the one hand income statistics indicate a decided check in the growth of revenues. Assessments increased, between 1855 and 1865, 28 per cent.; between 1865 and 1875, 44 per cent.; between 1875 and 1885, only 10 per cent. Receipts from railroad goods traffic per head of population increased 63 per cent. between 1865 and 1875, and only 18 per cent. between 1875 and 1885. The production of coal and pig-iron shows a similar diminished rate of increase, and the consumption of tea and sugar has not increased as rapidly as in previous decades. But Mr. Griffen regards these figures as deceptive, simply because prices have so declined that there must be added nearly twenty-five per cent. to the statistics for 1875–1885 before any fair comparison can be made with those of earlier decades. When this allowance is made, the rate of increase of assessments for 1875 to 1885 falls only 4 per cent. below that of 1865 to 1875.

Nevertheless, he believes that there has been some abatement of industrial progress, and especially a change in its direction. A larger portion of the population is now employed in satisfying wants the demand for what Mr. Griffen styles "incorporeal products." Statistics show a large increase in the number of persons engaged in transportation, and in indefinite employment, and a considerable gain in the classes devoted to commerce, education and art. Society is developing its tastes, and the occupations which these necessitate. There is also, perhaps, a tendency to take life easier—to work fewer hours—but Mr. Griffen does not find this to have had much influence upon revenue.

He shows that much must be credited to mere change in productive activity. Wool was the first industrial "king," then its manufactures, then cotton and its products, then coal and iron, whose reign is now on the decline. The production of coal for example, has decreased in rate of increase in Germany, England and the United States. Society is turning its attention to miscellaneous industries, prices of material necessities are lower, and there is greater desire and opportunity to satisfy the less material necessities of life, among which are to be classed railroad travel and a good deal of transportation of various sorts.

The American Brake Co., of St. Louis, is engaged in perfecting the details of a new automatic air brake for freight trains. Some informal trials were recently made at St. Louis with this brake, which is operated by air without the use of electricity, and when tried in the shops on a 12-car train, the brakes on the last car are stated to have been fully applied in ¾ second, and released in 3½ seconds. It is of course premature to estimate the time when the brake is fitted to a 50-car train. In order to apply the brake the air is released from one side of the brake piston by a special valve on each car. The air on the other side of the piston then expands, moves the piston and applies the brakes. The release is effected by restoring the equilibrium of pressure on both sides of the piston. The engineer's valve is specially designed to enable the brake to be applied with any desired amount of force, which can be increased or diminished without releasing the brake. This quality is likely to be particularly useful in running down long grades.

Trains are run too fast on many of the poorer roads in Illinois, according to the opinion of Railroad Commissioner Rogers of that state, as quoted in a press dispatch. He says some of the roads are in very poor shape, and run trains at 30 miles an hour where the maximum speed should be 25. If the roads are reckless, even in a small degree, in this respect, the commissioners ought to not merely give their views to a reporter, but to publish them officially; and perhaps go further, as the Minnesota board threatens to do in the matter of the fire-extinguisher law in that state. The Bussey bridge disaster emphasized the fact that private notices from commissioners to railroads do not always have the desired effect. There are many hundred miles of very poor track in the country, and unfortunately most of it is likely to remain poor for some time to come; but the least the proprietors can do is to limit the speed of trains to a rate corresponding to the condition of the track they have to travel upon.

In describing the Boston & Albany drawing-room cars, illustrations of which appeared in our last issue, we fell into the error of ascribing to Mr. F. D. Adams, Master Car-Builder, the credit for the general design and the constructive details. By letters received from Mr. Adams and others it appears that in this we were in error. To the Wason Company alone, and the architect, Mr. Price, belongs all the credit, unless we include incidentally the company which was willing to provide such luxury for its patrons. And they are wonderfully fine cars.

In another column will be found some notes of the work of Mr. Dudley and his dynagraph in his examination of the Boston & Albany track. Our readers are fairly familiar with the apparatus and its earlier doings, but less is known of the latest practice with it. The nicety with which it records differences of level and the gradual increase in precision of observation as the track is improved, are interesting.

Progress and improvement are constant concomitants of American railroad enterprise, and we to-day have the pleasure of announcing another decided advance in the march toward perfection of the superb Pennsylvania Railroad. A few weeks ago we chronicled the fact that this road had outdone all its competitors in the excursion line by providing a feminine porter, who was called a matron; but an added touch of refinement has now appeared, and we hasten to make note of the fact that the next excursion will have, not a matron, but a chaperone.

The gross earnings of the Pennsylvania's lines east of Pittsburgh and Erie for September are the largest ever reported in this month, $5,006,568, being an increase of 7.11 per cent. over last year, but the operating expenses increased in still greater ratio, leaving the net earnings $58,340 less than for September last year, or $1,758,195. The extensive improvements still going on account for the heavy operating expenses, which are also the greatest ever reported for the system. The gross and net earnings and operating expenses for nine months are all materially increased. On the Western lines also the net earnings are increased, showing a net surplus against a deficit last year. The results are given below:

September.	1887.	1886.	Inc. or Dec.	P.c.
Gross earnings....	$5,006,568	$4,674,052	I. $332,516	7.11
Oper. expenses....	3,248,373	2,857,517	I. 390,586	13.67
Net earnings.....	$1,758,195	$1,816,535	D. $58,340	3.21
Jan. 1 to Sept. 30:				
Gross earnings....	$41,053,675	$36,866,283	I. $4,187,392	11.35
Oper. expenses....	26,930,019	23,894,451	I. 3,035,568	12.34
Net earnings.....	$14,123,656	$12,971,832	I. $1,151,824	8 88
Net West. lines ...	1,035,928	Def. 92,436	I. 1,128,364	....
Total net.	$15,159,584	$12,879,406	I. $2,280,178	17.75

A railroad appears to develop connections with every sort of traffic, and now it appears that the Atchison, Topeka & Santa Fe has been bringing east a new species of insect, a purslane moth from the far West, which has already frightened the farmers of Kansas into the belief that a new edition of the army worm is upon them. It seems, however, according to Mr. F. H. Snow, of the University of Kansas, that the building of the railroad has carried our garden "parsley" all along its line, and has so opened an inviting succession of free lunches to this new visitor who had formerly been content to live on a wild western variety. Experiments with the caterpillar of the north proved that it would eat only purslane leaves, although it may yet attack the grape leaf, but unless it do so it is likely to prove a blessing, as "parsley" is one of the pests of our Eastern gardens. The dreadful potato bug made its way eastward in a similar manner. It had lived on the Texas thistle, a species allied to the common potato, and when the latter reached its territory quickly began to march eastward along the line of the potato field. Railroad botany is perhaps not a thing of the distant future.

The November number of *The American Garden* has a brief article on individuality of station appearance. This is a subject on which much may be said. A new road, even one with so much money as had the West Shore, will naturally adopt three or four plans and styles of building and scatter these over the line, except at a few important points. The opportunity for individuality arises when rebuilding commences, and we are of the opinion that it should be seized. A good station lasts a long time, and it is important that it should be attractive and tasteful. The Erie has built 26 new stations in the past year, and the aim has been to give individuality to each. Among these are the new building, not yet completed, at Jersey City, and the Rochester station, finished last year; and we note that in both these the plan of a central hall, with rooms about and a gallery above, has been adopted. This is the old Boston & Providence plan (Boston terminus), which the Pennsylvania followed, if so simple a plan can be said to have a claim to originality, at its Broad street terminus in Philadelphia; and no better one have we ever seen. Interior arrangement and the relation of the telegraph office to a full view of the track especially must predominate in station construction, but there is also room for a great variety of forms and appearance, and these many considerations demand.

The grade crossing problem still agitates Connecticut, or a portion of it, though much of the matter printed seems intended rather to conceal facts than to illuminate them. It is now stated that of changes ordered by the railroad commissioners at 22 crossings on the New York, New Haven & Hartford, 20 of them on the Shore Line division, the total cost was $108,330, of which $87,730 was paid by the railroads, and only the remaining fifth ($20,600) had to be borne by the towns. Still, the towns keep up their clamor for an extra session of the legislature to modify the law into a shape more favorable to them, though it is intimated that most of the "public demand" comes from one town and from a small circle of individuals. Doubtless the taxpayers take into account large sums under the head of street alterations, damages to abuttors, etc., which are consequent upon the changes, but are not included in the sums stated by the commissioners in their award. Items like these, both favorable and unfavorable to the taxpayer, exist in all cases of this kind, and a one-sided view of them can be made into a very plausible "argument."

The large proportion of the New York, New Haven & Hartford's changes on the single track Shore Line division is noticeable. Evidently the managers expect to do a good deal of through business over that portion of their road.

The *Standard*, of Buenos Ayres, gives a brief account of a project lately laid before the Congress by Mr. F. L. Griswold, member American Society of Civil Engineers, for a railroad of 450 miles, 5 ft. 6 in. gauge, to extend from Pergamino to Rio Cuarto, with branches to Frayle Muerto and to Cordoba. These branches are included in the 450 miles. The cost is estimated at £2,793,000, and a guarantee of £140,000 a year is asked. The projected line is intended to open up to agriculture and grazing a region now practically unoccupied.

The annual report of the Central Argentine for 1886 shows an increase in net earnings, and the directors recommend an additional dividend of 7 per cent., making 12 per cent. for the year. The total capital is £2,358,307. The operating expenses are about 45 per cent. of the gross receipts.

NEW PUBLICATIONS.

A Freight Received Book, of novel form, has been devised by M. M. Kirkman, of Chicago, who has copyrighted it and put it in use on the Chicago & Northwestern. The book has a page for each item, and the page is the size of a "voucher" or expense bill. By the use of carbon sheets, the *voucher*, the *notice* to the consignee and the *record* of freight received are written at once (the first two being torn out after being filled up), thus saving the clerical labor of entering each item three different times. The principal advantage in such a form (beyond the saving in writing, which is partially or wholly offset by the disadvantages), is stated by the publisher to be that "Under the old method blank expense bills were furnished to agents, which could be used at their pleasure, without its being possible to ascertain how many they used, or for what purpose, or whether the money was accounted for or not. In this form each expense bill furnished is numbered, and must be used in connection with a corresponding page of the freight received book; it is impossible that an agent should use a blank receipt without leaving a record thereof, or a hiatus in the book. This renders it more difficult to suppress waybills." Mr. Kirkman proposes to have the consignee receipt for his goods on this book, and mentions the advantage of having each consignee's shipment entered where he can see it and yet be prevented from seeing his neighbor's entries, some consignees, as is well known, making this a regular method of prying into rivals' business. The Northern Pacific has also put in use a form similar to Mr. Kirkman's, which, however, provides only for the voucher and the receipt to be signed by consignee, leaving the record to be kept in the old way, the notice of arrival doubtless being omitted altogether. The reader will understand that the printed portions of the various forms in a book of this kind are arranged in any manner desired, but are inserted so that the written portion can be identical and in precisely the same position in each, this being necessary to admit of the use of the manifold process.

The unquestioned advantages of Mr. Kirkman's plan are, however, more than balanced by the disadvantages. In the first place, the receipt to be signed by teamsters and other non-clerical persons should not be identical with the record of freight received, which is a financial document and should be neatly kept. This kind of receipt should be detachable; receipts can be more readily and certainly obtained on loose sheets than upon a leaf in a bound book. Many agents have great difficulty in getting receipts, and need all possible aids. One teamster signing, say, six receipts, should be able to lay them all on a counter (or on a box in the freight-house) before him, so as to see them at one glance; not be obliged to turn to six different pages in a book and possibly in six different books. One great desideratum in a record is to have it compact and readily accessible. In the ordinary form 30 to 50 entries appear on a page, and the book can be written up after the way bills have been properly arranged, one book thus holding, say (250 pages of 40 lines) 10,000 entries; to have ten thousand pages for this amount of business, with a separate footing for each page—forty times as many footings as before—is well nigh intolerable, especially if the pages are in a book from which two-thirds of the leaves have been torn out, thus leaving the binding somewhat loose and shaky. To use the manifold process the hand-writing must be rather coarse, and this tends to undue enlargement of the sheet. Seven by 13 in. as arranged by Mr. Kirkman, or even 4 by 13, as in his smallest size, is an unwieldly paper for a voucher or a notice of arrival. The latter should be no larger than a postal card. Many would object strongly to this book merely on the score of expense.

The labor of keeping an ordinary freight received book is considerable, especially when it is considered how comparatively seldom it has to be referred to after it is a month or two old; but roads keep it up because the record is in the most desirable shape, and is easily compared with the cash book. If it were to be discontinued the best substitute would be the filing of the original way-bills in an invoice book. This could be done a week or a month after arrival, and thus admit of the best arrangement. To have the record written up immediately and in the order of the arrival of shipments sacrifices some of the most desirable features of a record.

Mr. Kirkman will send samples of the book for 50 cents each.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887, not before reported, is given as follows:

Fort Worth & Denver City, 389 miles from Fort Worth, Tex.; 44 miles since last reported.

Mahoning & Shenango Valley, from Doughton Junction, Pa., to the state line, 6 miles.

Natchitoches, from Prudhomme to Natchitoches, La., 14 miles.—*Roanoke & Tar River*, from Baykim, Va., to Beverly, N. C., 31 miles; 28 miles since last reported.

St. Paul, Minneapolis & Manitoba, Park River Branch, to Langdon, D. T., 40 miles.

TECHNICAL.

Locomotive Building.

The Rhode Island Locomotive Works have just received an order from the Western & Atlantic for three 10-wheel locomotives, two of which are to be delivered Jan. 1.

The Taunton Locomotive Works have completed two large six driving wheel switching engines for the Atchison, Topeka & Santa Fe.

The Car Shops.

The St. Charles Car Co. has closed a contract with the Mexican Central for 250 box cars. The company has also contracts with the St. Louis, Alton & Terre Haute for 7 coaches and a number of mail and express cars, and the Atchison, Topeka & Santa Fe for 600 coal and freight cars. These insure work for all winter. The plant is also being extended.

The Indianapolis car-works have just been awarded the contract to build 300 freight cars for the Chicago, Burlington & Quincy.

The Missouri Car & Foundry Co. have been given an order for 500 flat cars by the Missouri Pacific.

The second and last order of cars which the Wason Co., of Springfield, Mass., has built to be run on the government road in Chili, have been shipped. The company is now at work on eight passenger coaches for the Charleston, Cincinnati & Chicago Railroad. These cars are built on the patent taken out by A. B. Harris, Vice-President of the Connecticut River road, and are similar to the one built for him last winter.

The Richmond & Danville has ordered 15 cars and 7 locomotives equipped with the Martin system of steam heating.

On the Old Colony road there are 158 passenger cars with the "Johnson" heater, 33 coal and 70 wood stoves, besides 41 baggage and mail cars with coal stoves. The larger part of the cars with stoves consists of the older cars little used in winter. During the coming winter the road intends to make a trial of the system of heating cars by steam from the locomotives, and will probably equip one train each with the Sewall" and F. M. Wilder device for this purpose.

Bridge Notes.

The Groton (N. Y.) Bridge Co. has secured the contract for building the pier at Fortress Monroe, Va. Over 500 tons of iron castings are called for in the estimate.

The Elizabeth Bridge Co. has organized in Elizabeth, Pa., to build a bridge over the Monongahela River there. The President is W. W. O'Neil.

Bids are invited for a bridge, either iron or combination, over Maumee River, at Waterville, Lucas County, O., of 5 spans, 168½ ft. each. Address Chas. A. Vantriede, Auditor, Lucas County, Toledo, O., until Oct. 31.

The Oconee Bridge Co. (Dr. R. H. Hightower and T. M. Hightower) proposes to bridge the Oconee River at Dublin; another project is to build the bridge out of public funds. Address T. H. Bush, Dublin, Ga.

The City Council of Newport, Ky., have passed the ordinance granting the Union Bridge Co. the right to build a bridge over the Ohio River from Newport to Cincinnati. The bridge is estimated to cost $1,500,000.

The California Bridge Co. has received the contract for a 600-ft. cantilever bridge over the Umpqua River at Roseburg, Oregon, to cost $45,000.

The Cheshire Railroad will build a bridge at Bellows Falls, Vt.

The Commissioners of Nantucket, Mass., will build a bridge.

The Commissioners of Hollister, Cal., will build a bridge across the San Benito River. Cost, $15,000.

The County Commissioners will build a bridge at Ashtabula, O. Cost, $30,000.

Manufacturing and Business.

The New York, Chicago & St. Louis has given an order to the Safety Car Heating & Lighting Co. to equip a passenger train with its heating apparatus.

The National Paint Works, of Williamsport, Pa., report orders for several car load lots of their paints from railroad, car and bridge works.

The Natural Gas Car Heating and Lighting Co., of Chicago, has been incorporated with a capital stock of $300,000. Incorporators, Harry W. Holmes, Lewis K. Curlett, William S. Brewster.

The Morris Car Co., of Chicago, has been incorporated with a capital stock of $150,000; object, to buy, sell or lease all kinds of cars; incorporators, Edward Morris, Alexander Gilkison and H. M. Wolf

The Ætna Machine Company, of Warren, Pa., is at present engaged on two of Smith's furnaces for Norton Iron Works, Ashland, Ky., and one furnace for Lake Erie Iron Co., Cleveland, O.; a 14-inch roll train for Hartman Steel Co., Beaver Falls, Pa., and have just completed a Smith's furnace for Britton Iron & Steel Co., Cleveland, O.

Paine & Francis, New England agents of the Edison United Manufacturing Co., have received an order to install an incandescent plant in the mill of the Fitchburg (Mass.) Paper Co.

The Sawyer-Man Electric Co. has installed in the works of the Putnam Nail Co., at Neponsit, Mass., a plant of 80 incandescent lights. Among the other recent installations made by the company are the following: Cohanet Mills, Taunton, Mass.; factory of Abbott & Co, Forge Village, Mass.; mills of the Goodyear Metallic Rubber Shoe Co., Naugatuck, Conn.

Charles A. Shieren & Co., agents for the American Leather Link Belt Co., report sales of their link belting to various railroad and manufacturing companies in all parts of the United States.

The Cedar Rapids (Ia.) High Speed Engine Works has just been organized to manufacture the Swain automatic engine. Henry Rickel is President, and I. M. Swain Treasurer. Capital stock, $50,000.

The Oil City Boiler Works, at Oil City, have just made a contract for 340,000 of iron work (about 750,000 lbs.) for the Omaha & Council Bluffs Bridge Co.

The Roller Chain Belting Co., of Columbus, O., manufacturers of detachable chain belting and mining machinery, have purchased a three-acre tract of land, upon which they will at once erect a new plant

The Mather Electric Co., of Minneapolis, Minn., is putting in a 600-light plant for F. L. Mortimer, Minneapolis, and has just put in a 500-light plant for Frank P. Blair, St. Paul.

The P. H. & F. M. Roots Co., of Connersville, Ind., makers of the Roots blowers and exhausters, has enlarged its works doubling their capacity.

Messrs. Grassler & Elliot, of Williamsport, Pa., have applied for patents on a system of continuous heating and on an automomatic metallic coupler.

The Spliced Rail Joint Co. has increased its capital stock to $500,000, and has bought all of Francis Lightfoot's U. S. patents. The company will not manufacture if arrangements can be made with rail makers to work under the patents on royalty. A length of 600 ft. of 70-lb. rails have been in use on the Pennsylvania for 10 months, with two bolts to the joint.

Iron and Steel.

Coleman, Shields & Co. have purchased the original Ward mill at Niles, O., and have this week started 16 puddling furnaces and the plate mill, making skelp iron for pipes and tubes.

The Chester Foundry and Machine Co., Chester, Pa., is reorganizing its machinery department and putting in machinery for manufacturing the Brotherhood steam engine. The new foundry is 100 × 25 and contains two large cupolas. Mr. John Sanders, formerly with the Brotherhood engine of England, will superintend the construction of this engine.

A large foundry is to be erected at Leechburg, Pa. A charter of incorporation has been asked by a number of prominent citizens of that place, who, under the name of the Leechburg Foundry & Machine Co., propose erecting a plant to be worth in the neighborhood of $100,000, and give employment to nearly 100 men.

Articles of incorporation of the North American Iron Co. have been filed at Detroit. The stock of the company is held entirely by Detroit parties.

A blast furnace and rolling mill is to be erected at Duluth, Minn., by a syndicate of capitalists. The blast furnace will be of moderate size, intended to produce 75 tons daily of coke pig-iron. A large steel plant is also talked of by the same parties.

It is stated that the Tennessee Coal, Iron & Railroad Co. and the Sloss Iron & Steel Co. have bought the right to manufacture steel by the basic process of Jacob Reese, have selected sites at Ensley, Ala., for steel works and propose to begin work soon. Mr. Reese states that the American Basic Phosphate Co. will build fertilizer works with a daily capacity of 300 tons.

The Rail Market.

Steel Rails.—The market is dull. A sale of a 2,000 ton lot is reported to a Southern road. The price at mill is $34. It is said that some business has been done at $33.

Old Rails.—The market continues quiet. Private term sales amounting to 3,000 tons are reported. Quotations: Tees, $22.25@$22.50.

Scrap.—Sellers ask $20@$20.50, ex-ship, for foreign, and $21@$22 from yard, domestic.

Rail Fastenings.—Quotations: Spikes, 2.25@2.40c.; angle bars, 2.10@2.20c.; bolts and nuts, 3@3.25c.

Continuous Heating on the Fitchburg.

The Sewall ystems of heating cars will soon be in extensive use on the Fitchburg. Some 30 cars and the requisite number of engines will be ready for use by the beginning of winter.

Eight-wheeled Horse-cars.

Mr. Moses Humphreys, of Concord, at the recent convention of the American Street Railway Association, at Philadelphia, stated that he had found eight-wheeled horse-cars could carry a heavier load and be propelled much easier by animal power than those of four wheels. The eight-wheel cars run more smoothly, and he believed the day was not far distant when the eight-wheel system would be adopted altogether.

Dyer's Automatic Fire Extinguisher.

This apparatus is of the nature of a chemical fire engine or extinguisher. A tank charged with some proper solution is suspended in the car or engine cab, and pipes are led to the fires and lights. A cock communicating with the pipe is kept closed by a spring. Below this spring is hung a heavy pendulum which swings freely. In case of collision or the overturning of the car the motion imparted to the pendulum opens the cock and allows the liquid to flow from the tank through the pipes. It is obvious that a comparatively small quantity of carbonic acid gas, liberated immediately over the fire, would extinguish it at once. A hose is also attached to the tank by which the liquid can be carried to a fire at some distance from the car. The office of the Dyer Railway Automatic Fire Extinguisher Co. is at 232 Clark street, Chicago, where further particulars can be had.

The Pitch Lake of Trinidad.

Nearly all the bitumen of commerce is derived from the famous Pitch Lake on the Island of Trinidad. There are undeveloped deposits of bitumen in California, Utah, Mexico, on the southern shores of the Gulf of Mexico, and on the Island of Cuba, but none of them are worked to any extent, and the dependence for roadway paving, mastic and other uses is almost entirely on this great natural deposit. As found, besides water and vegetable matter (sticks, leaves, etc.) it contains about 50 per cent. of fine clay; as ordinarily purified, about half this clay is extracted and it is then sold as asphalt. For some time the output of this lake has been in the hands of a syndicate, composed of Messrs. Barber, of the Barber Asphalt Paving Co., and Warren, a pitch roofer and paver on this side, with Pervite & Greig, Callender, of London, and some continental firms for the European side. On the expiration of this contract it was proposed to throw the export of the pitch open on payment of an export duty, but we learn from the Colonies and India that instead "a concession for the sole export of pitch, won from the Pitch Lake, is granted to the New York & Trinidad Asphalt Co. for a period of 14 years, a minimum of £10,000 annually as export duty being guaranteed for that period at the rate of 6s. 8d. ($1.60) per ton. Should the export duty paid during the 14 years amount to £168,000, the lease to be renewed for a further period of 7 years." The same paper in a previous issue states that Barber & Greig have succeeded in getting an entire monopoly of the Pitch Lake. The attorney-general of Trinidad said that he had the opinions of the annual purchasers of about 180,000 tons of Trinidad bitumen and only the purchasers of 25,000 tons were in opposition, which seems to show that the old syndicate have made arrangements with the large consumers to supply them on terms which were so far satisfactory that it was not worth while to continue opposition to the monopoly.

Continuous Heating.

The Long Island and the Central of New Jersey have adopted the Gold system for heating their passenger trains. Orders have been given to commence at once the work of equipping.

The Sewall Safety Car Heating Co. has decided to sell its couplers separately. This, it is said, is at the suggestion of several prominent railroad men.

New Roundhouse.

The New York, New Haven & Hartford is building a new roundhouse at Springfield, Mass. The work is founded on piles, and 500 car-loads of granite have been used in the walls and foundations. The building will be heated by steam supplied by an old locomotive boiler, nearly 12,000 ft. of 1 in. pipe being used. A hydrant will be placed between every other of the 16 pits, and instead of wooden stringers for the rails, as is usual in buildings of the kind, iron will be used. The locomotives will run into their stalls head first, and the smoke-stacks will be on the outside rim of the building. The building is very solidly built, and is estimated to cost over $150,000.

Gas Well Notes.

A powerful gas well has been struck at Greentown, Ind., nine miles east of Kokomo. The well, which was put down in 15 days, is a very strong one and is perfectly dry.

A new well has been finished at Kokomo, the estimated yield of which is 5,000,000 cubic feet per day, making it the third in point of yield of the eight wells so far drilled in that place, the aggregate yield being 40,000,000 cubic feet per day. This last well, 927½ ft. deep, was drilled in eleven days actual drilling time.

The area of the Kokomo field is proved by the Greentown well to be about 30 square miles. Some 22 miles of pipe are being laid for factory and domestic use. The new glass works at this place commenced making glass on the 10th inst.

Kokomo is somewhat noted for the fact that the farmers in the vicinity took advantage of the light given by waste gas burning from the great Shrader well to harvest their crops by night.

In Findlay, O., Hirsh, Eley & Co., start the sixth glass works in that town this week, giving employment to 125 men. Glass making is fast becoming the leading industry of that town.

THE SCRAP HEAP.

An Old Suit Settled.

The suit of many years' standing of Samuel F. Vilas, of Plattsburg, N. Y., against John B. Page and others, has been ended by a judgment entered for the plaintiff for $75,000. The case has been tried several times in New York state and has a long history of appeals. It has been in litigation since 1854, when judgments were found against the Plattsburg & Montreal Railroad, and action began in 1875 to enforce a lien on the New York & Canada Railroad, and judgment was against Gov. Page and the other defendants for $18,000 and interest from May, 1855.

A Dishonest Official.

Thomas H. Davis, a cashier and assistant freight agent of the New York Central & Hudson River road in New York City, was arrested last week and brought into court on the charge of having stolen $15,000 from the company. He admitted his guilt and said that his downfall was due to gambling. He is about 40 years old and has been in the employ of the company for 11 years. It is not probable that any of the stolen money will be recovered.

Railroad Miners' Wages.

An advance of five cents per ton will not be paid the railroad miners of the United States on Nov. 1 as was agreed upon under certain conditions by the National Joint Board of Miners and Operators which met at Columbus in April. Five cents per ton advance in wages was made on May 1, and another five cents was to be added on Oct. 1, providing the miners in all competing districts would make a firm demand for the scale. In Southern and Central Illinois the operators have refused to pay the five cents a ton advance ordered on May 1, and the miners not being properly organized have been unable so far to compel them to do so.

A New Foreign Mail Service.

A dispatch from Lisbon to the New York *Tribune* dated Oct. 24 says: The first sleeping-car express, inaugurating the special mail service between London, Paris and Lisbon in connection with the ocean steamship service to South America and South Africa, arrived here to-day full of distinguished visitors. Delegates from all the European powers attended a banquet on board the Union Company's steamer Athenian. Toasts to the King of Portugal and Queen Victoria were drunk with enthusiasm. The speakers referred to the advantage of expedition in the transmission of mails.

Whistling Winds.

A hurricane near Port Colborne, Ont., on Oct. 24, blew down the car shed of the Grand Trunk road and turned bottom side up three passenger coaches.

Newly Arranged with Variations.

A very singular loss and recovery occurred recently on the Union Pacific near Laramie. A special freight, running passenger time, broke in two on the hill and the front section ran around a sharp curve so fast that it whipped off the rear car, filled with choice Chinese silks, into the gulch, where it disappeared from sight in the heavy brush. The break was so clean that the two sections were coupled together without the single car's absence being noticed. For two months that car lay there while the entire road was being searched far and near for it. The other day a cowboy rode into a small station on the line and casually asked when they were going to clear up that wreck down in the gulch. The agent knew of no wreck, and thought the cowboy was fooling with him, but at last, convinced he was in earnest, went with him to the spot. There, at the bottom of a very deep fill, behind a huge pile of boulders and a mass of sage brush, lay the missing car, No. 99. It was resting on its side, and strange enough the trucks were in proper place. The doors were sealed, and there was nothing beyond a few bruises and dents in the roof and sides to show that there had been any rough treatment experienced.—*Omaha Republican.*

Mexican Justice.

In a recent case tried at Aguascalientes, Mex., the driver of a locomotive and other train men were charged with causing the death of a man overtaken on the track by the train. The judge, probably weary of hearing cases involving the use of railroad tracks as public highways, discharged the accused, and remarked to the complainants: "Those ties over there were intended to have rails on and the rails were intended to carry trains. If you will agree to keep away from the track I will see to it that the train don't chase you about the fields."

Courage That Paid.

J. Ernest Smith, who was energetic enough to kill two train robbers some days ago on the Southern Pacific near El Paso, Tex., will receive $500 for each robber from the railroad company. This insures Smith a total of at least $6,000 in reward.

The Book of Creation in the Passenger Department.

A steamboat manager in St. Johns, N. B., has a poetic soul. In advertising for passengers he says: "Citizens and tourists should not spare time or money in seeing the great Book of Creation and this Grandest of Rivers decked in its brightest holiday attire. For how mean is riches when it don't impart knowledge to the mind that elevates the heart."

A Railroad in the Frigid Zone.

The first train to cross the Arctic Circle passed the line on the Lulea Railway a week or two ago. This most northerly railroad in the world runs up from the Swedish port of Lulea, at the head of the Gulf of Bothnia, into Swedish Lapland, within four miles of the Gellivara Mountain, famous for its yield of iron ore. The works were begun 27 years ago, and then were given up until quite lately.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings of the stockholders of railroad companies will be held as follows:

Eastern Illinois & Indiana State Line, special meeting, at the office, Chicago, Ill., Oct. 31.

Momence & State Line, special meeting, at the office, Chicago, Ill., Oct 31.

East Tennessee, Virginia & Georgia, annual meeting, at the office, Knoxville, Ten., Nov. 16.

Indiana & Western, at the office, Indianapolis, Ind., Nov. 10.

Northern Pacific, meeting of preferred stockholders, at the office, New York, Nov. 3.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *New England Railway Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

Engineers' Club of Philadelphia.

The first fall meeting was held Oct. 1.

Mr. J. M. Cameron described the Carnell air injector. This machine is intended to supply air to the furnaces of steam boilers of all classes. Steam is taken from top of boiler and carried through the combustion chamber, where it is heated to about 900 degrees Fahr., then to a distributing apparatus discharging under the grate. The steam, heated to the condition of a gas, takes with it the necessary air for combustion. It is claimed that the heat to which the steam is raised, in connection with a reduction of pressure to 20 lbs. per square inch, increases the relative volume to 1,800, which would be eight times more effective than saturated steam. The heat taken from combustion chamber is given out to the air entering the furnace. Tests are said to have shown an increased boiler power of 28 to 100 per cent., with a proportionate saving in fuel of 2 per cent. above that obtained by natural draft.

Mr. Henry G. Morris exhibited and described a working model of a traveler to carry wires, ropes, etc., through conduits, which he had devised.

Prof. L. M. Haupt made some remarks upon his experiments with current deflectors at Five-mile Bar, and showed how urgently the city and river interests required a channel across it. He then suggested a plan whereby he proposed to create a channel, sufficient to meet the demands of commerce, upon the following principles:

1. If the *bottom velocity* of a stream be increased to the limit required by the character of the material forming its bed, it will scour; if diminished, it will deposit.

2. If the *momentum* of a stream be suddenly arrested by an obstruction placed in its path, a reaction will be produced, its head will be increased, and the bottom will be scoured out.

3. If the *volume* of a stream be partially deflected by a trailing wall, from one side of a cross-over bar to the opposite side, the current over the bar will be quickened, and the crest lowered above the line of the works.

4. If the *form* of the cross-section of a stream be modified by cutting at one point and filling at another point of the same section so that the area is not changed, other things being equal, the discharge will not be materially affected, and the part so deepened will remain open.

5. If a stream be compressed laterally into a smaller section, its velocity head near the banks will be increased, while that at the centre will be diminished, and consequently the channel will be bifurcated and the deepest water be found near shore.

If, by the application of these laws of flowing water, a channel, sufficiently wide and deep for navigation, be cut across a bar, it will be self-sustaining, and cost much less than if the entire bar were disturbed by the usual lateral dikes or by dredging.

American Society of Civil Engineers.

At the regular meeting, Oct. 19, a paper was read by the Secretary "On Brick Making in Sinaloa, Mexico," by Senor Don Juan Soss Y Avela, of Culiacan. The writer briefly described the process of making *adobe* or sun dried bricks and burned bricks for house building, tiling, etc. Mr. J. Foster Flagg mentioned that in Peru the sun dried bricks seemed to improve in quality with age, and when walls, 300 years old, were torn down in Lima the old material sold for more money than new bricks of the same character could be bought for.

Papers were read upon the results of "Experiments as to the Influence of Fineness of Sand upon Cement Mortars." The first was by Mr. Emil Kuichling, and gave the result of tests made for the Rochester (New York) Board of Public Works, by the Engineering Department of Cornell University. Comparative tests were made with standard quartz sand, and the local sands of Rochester, used with Akron, Star and Buffalo brands of cements. These tests were given in detail, and the general conclusion confirmed the opinion of previous experimenters that, other things being equal, the coarser sand gave the best results.

A paper by Mr. E. B. Noyes gave notes upon the rather peculiar behavior of Bangs & Dana cement, and other brands from the natural cement quarries in the neighborhood of Syracuse, N. Y. Mr. Noyes has been testing these cements for the State Board of Public Works, and gave his results in detail and by diagrams. The peculiarities noted are that the cement is exceedingly coarse as delivered, and that the neat cement tests invariably fell below the combined cement and sand tests for any age of cement. These notes brought out considerable discussion upon the effect of coarse and fine sand upon cements and that of coarse particles in the cement itself. Mr. Parsons advanced a theory that the usual high tensile strength of cement mixed with standard quartz sand as compared with the neat cement test, in ordinary brands, might be due to the roughness of the sand particles and their interlocking in the mass. The effect of such sand in a tensile test was either a break across the sand particles, which are usually stronger than the cement itself, or a break around the sand particles, and thus virtually present a greater area of fracture than that assumed. The neat cement not having any obstructing particles of this nature would break in a straight line across the briquette, and show a lower breaking weight comparatively.

New England Roadmasters' Association.

The annual meeting of this association was held at Hartford, Conn., on Oct. 19 and 20. The following officers were elected: President, J. S. Lane, New York, New Haven & Hartford; Vice-President, J. R. Patch, Connecticut River; Chaplain, E. N. Horner, Central Vermont; Secretary, W. F. Ellis, Providence & Worcester; Treasurer, George Nevins, Maine Central; Executive Committee, P. A. Eaton, Concord; L. H. Perkins, New York, New Haven & Hartford; G. W. Bishop, Fitchburg.

At the evening session of the first day the question was on The economy of labor and material in maintenance of track. The proper length of sections; the number of men to each section according to the season of the year, and the work suited to the different months were discussed.

The next meeting will be held in Boston on the third Wednesday in August, 1888.

Enginering Club of Kansas City.

A regular meeting of this club was held Oct. 3. Messrs. E. W. Sterns, Charles H. Talmage and Charles W. Hastings were elected members.

A paper by Mr. M. K. Bowen was read, on "The Construction and Operation of the 9th street Cable Railway.

Boston Society of Civil Engineers.

A regular meeting of this Society was held Oct. 19.

Messrs. Phinehas Ball, of Worcester, and Lyman Garry, of Stoneham, were elected members.

A report from the Government of the Society was adopted, authorizing the Board of Managers of the Association of Engineering Societies on the favorable action of the American Society of Civil Engineers and of two-thirds of the societies in the Association to call a convention of delegates from engineering societies; this convention to consider the question of organization of the several societies of the country into a confederation, or such other union as may be found desirable. The representation of each society should be 3 votes, with one additional vote for each 50 or fraction thereof in excess of 100 members. The conclusions of this convention shall not be binding upon any society participating until ratified by that society.

The Secretary read a communication from a committee on the metric system from the Western Association of Architects, asking co-operation in petitioning Congress to pass a law making the use of the metric system compulsory on the various departments of the government. This was referred to a committee on weights and measurements.

Professor Norton read a paper by the late Prof. W. R. Nichols on the action of Boston water on certain sorts of service pipe.

Professor Norton requested information in regard to the most satisfactory paint used for the preservation of bridges against the action of the atmosphere. Mr. Barlow, engineer of the new Tay Bridge, had asked about American practice. Mr. Manley said that his experience led him to prefer red lead to any of the mineral paints he had tried. He believed that red lead would resist better than any other paint the action of salt water and the sulphurous gases from locomotives. Mr. Parker thought that the secret of efficient painting lay in thoroughly cleaning the iron of scale.

Prof. Swain spoke on the dimensioning of bridge structures, and gave the result of some investigations upon the distribution of wheel loads of the floor system commonly found in railroad Howe truss bridges. He also gave a method for determining the proportion of load borne by the beam and the truss-rod in the common form of King post truss beams. The question of bending and compression combined was also briefly taken up, and a formula suggested based upon Wöhler's experiments, which was simpler in the application than any modifications of Launhardt's now in general use.

Meeting of Steel Manufacturers.

The National Association of Steel Manufacturers held a meeting in Pittsburgh, Pa, on Oct. 25. Nearly all of the Bessemer and open-hearth steel manufacturers in the county were represented. Among them were Hussey, Howe & Co., Hartman & Son, of Beaver Falls; Bolton Steel Co., of Canton, O.; J. R. Thompson, of Jersey City; Benjamin Altha, of Newark, N. J.; Guadier Steel Co., of Johnstown; Sweets Manufacturing Co. and Sanderson Manufacturing Co., of Syracuse, N. Y.

The meeting was called to order by Chairman James Brown, of Hussey, Howe & Co., the secretary being Mr. Wm. Guthrie. The reports of the business outlook were read, and it was decided to change the classification of the different grades of steel. This includes changes in the extras made on steel.

PERSONAL.

—A. E. Bateman resigned from the directory of the New York & New England this week.

—G. M. Cummings, Assistant General Manager of the Union Pacific, has tendered his resignation.

—Samuel Smith, until a few months ago Assistant General Freight Agent of the Wabash Western, died in New York last week.

—Robert Garrett left Baltimore on Oct. 23 for Mexico, via Chicago and San Francisco. He will spend the winter in Mexico.

—Seth Bemis, who was one of the earliest directors of the Boston & Worcester and Fitchburg railroads, died at Boston, on Oct. 21, at the age of 75 years.

—Charles A. Holman, Train Dispatcher of the northern division of the Old Colony road, died suddenly in Fitchburg, Mass, on Oct. 20. He had been Train Dispatcher for nearly 15 years.

—Col. Henry B. Fiddeman, President of the First National Bank of Milford, Del., died on Oct. 26, at the age of 80 years. He was President of the Milford Steamboat Co., and also of the Junction & Breakwater Railroad when it was built.

—John H. Eames, formerly chief clerk in the office of the Purchasing Agent of the Coicago, Burlington & Northern, and later Purchasing Agent of the Minnesota & Northwestern, has resigned to become General Agent of the Union Steel Co., of Chicago.

—John B. Cornell, head of the iron firm of J. B. & J. M. Cornell, died at Lakewood, N. J., on Oct. 26, at the age of 66 years. He had been ill for several months. Mr. Cornell was born at Far Rockaway, L. I. He was trained in the iron foundry of Cornell, Althouse & Co., the head of which was his brother George. In 1847 Mr. Cornell and his brother William started in business under the firm name of J. B. & W. W. Cornell. William died in 1870, and the firm of J. B. & J. M. Cornell was formed.

ELECTIONS AND APPOINTMENTS.

Buffalo, Rochester & Pittsburgh.—H. S. Henderson, formerly Trainmaster, has been appointed Traveling Train Agent. C. F. Warner has been appointed General Car Agent.

Chicago, Milwaukee & St. Paul.—J. H. Hiland has been appointed General Southwestern Agent at Kansas City. Edward Shillito has been appointed Contracting Agent at Kansas City.

Chicago Transfer.—The incorporators are Ansel Oppenheim, Crawford Livingston, H. A. Gardner, Robert D. McFadon, William A. Gardner.

Cincinnati, Indianapolis, St. Louis & Chicago.—At the annual meeting this week the following directors were elected: George Hoadly, George Bliss, J. Pierpont Morgan, C. P. Huntington, New York; R. R. Cable, E. T. Jeffery, Chicago; Thomas A. Morris, Allen M. Fletcher, Indianapolis; Orland Smith, S. J. Broadwell, Larz Anderson, Alexander McDonald, M. E. Ingalls, Cincinnati. Mr. McDonald succeeds George Wilshire. The office of Vice-President was created, and E. F. Osborne elected to fill it, in addition to his duties as Treasurer. J. A. Davie was elected Secretary; M. E. Ingalls was re-elected President, and George Bender, Superintendent, in place of J. W. Sherwood.

B. E. Hahn has been appointed Assistant General Freight Agent, vice W. C. Hobbs.

Cincinnati, Sandusky & Cleveland.—The following directors have been elected: J. A. Jeffrey, Columbus, O.; N. W. Pierce and L. C. Wade, of Boston. The officers are: J. S. Farlow, Boston, President; N. W. Pierce, Boston, Vice-President; John L. Moore, Sandusky, Secretary and Treasurer.

Cleveland, Columbus, Cincinnati & Indianapolis.—John Swisher, one of the oldest conductors on this road, has been appointed Trainmaster of the Indianapolis Division, with headquarters at Union City, Ind.

East Tennessee, Virginia & Georgia.—P. S. Gilmore has been appointed General Northern Passenger Agent, headquarters at Chicago.

Illinois & St. Louis.—The old board and officers were re-elected last week.

Lake Erie & Western.—Calvin S. Brice has been elected President, Nelson Robinson Vice-President, and Samuel Thomas Chairman of the Executive Committee.

New England General Ticket and Passenger Agents' Association.—The semi-annual election last week resulted as follows: George W. Storer, of the Boston & Lowell, President; O. H. Briggs, of the New York, Providence & Boston, Vice-President; C. A. Waite, Secretary; S. W. Cummings, Central Vermont, member of the executive committee. Mr. N. P. Lovering, formerly General Ticket Agent of the Passumpsic Railroad, was made an honorary member of the association.

Northern Pacific.—Samuel R. Ainslie has been appointed Assistant General Manager of the Eastern Division, vice J. T. Odell, resigned.

Paintsville & Licking Valley.—The officers and directors of this Kentucky company are: President, John F. Hagar, Ashland, Ky.; Vice-President, Frank Preston, Paintsville, Ky.; Secretary and Treasurer, I. F. Stewart, Paintsville, Ky. Directors: John F. Hagar, Ashland, Ky.; Frank Preston and J. F. Stewart, Paintsville, Ky.; D. M. Hagar and M. Atkinson, Salyersville, Ky., and C. M. Jones, Columbus, O.

South Atlantic & Ohio.—H. W. Bates has been appointed Vice-President and General Manager, W. E. Chamberlain has been appointed General Superintendent and W. C. Harrington General Freight Agent. Headquarters at Bristol, Tenn.

Texas & Pacific.—George D. Brooks has been appointed Master Mechanic at Marshall, Tex.

Texas, Sabine Valley & Northwestern.—N. S. Easton, of New York, has been elected President; R. J. Evans, Vice-President and General Manager; D. S. Lorcher, Secretary and Treasurer, and C. W. Booth, Assistant Secretary and Treasurer.

Trunk Line Passenger Association.—O. P. McCarty has been appointed Superintendent of the Rate Department.

OLD AND NEW ROADS.

Annapolis, Washington & Baltimore.—It is reported that this company will sell its property to the Baltimore & Drum Point.

Arizona Belt Line.—President Eddy has prepared a statement of the the transactions between his company and the Atlantic & Pacific for the information of the subscribers to and holders of their securities. In answer to the assertion made by the management of the Atlantic & Pacific that they had never made any subscription to the Arizona road, President Eddy presents exhibits running from June, 1886, to October, 1887, consisting of telegrams, letters, copies of records of Executive Committee and Boards of Directors, etc., in which President Strong's name appears eight times, either individually or officially, as recognizing the validity of the Atlantic & Pacific subscription, agreeing to extend time of payment, to exchange old for new bonds, etc., etc.

President Nutt appears five times, President Winslow four times and other officers in greater or less degree, finishing up on June 21 with a telegram from President Nutt to President Winslow, expressing satisfaction with the ability of the Arizona Mineral Belt to build 80 miles of road, and the answer of President Winslow saying that he and Seligman would approve subscriptions, etc. Seventy-five thousand dollars of the securities, being amount due on 15 miles, is then tendered and accepted and receipted for by Treasurer Gardner, of the Atlantic & Pacific, and 51 of the railroad stock by Trustee Manchester. President Eddy then goes on to say that he was in such a hurry to get to Arizona that he did not get his money for the first installment of bonds and stock, but left word to have it deposited in the bank to his credit. This was not done. Mr. Eddy acknowledges an inability to understand the Atlantic & Pacific's motives in going back on its subscriptions.

Arizona Mineral Belt.—Construction work has been brought to a standstill on this road. There are now 36 miles of track completed. The managers are short of money. The road has been leased for operation to the Arizona Lumber Co.

Atchison, Topeka & Santa Fe.—Surveyors are at work 20 miles west of Trinidad, Col., in the direction of the Costilla Pass, and it is said that a line is to be surveyed to Holbrook, Ariz.

Atlantic & Pacific.—Four gangs of surveyors are at work on this company's extension from Rogers Station, Cal., to and through Antelope Valley to Tejon Pass. The distance from Rogers' Station to Rosamond, on the Southern Pacific, is about 12 miles, and the distance from Rosamond to Tejon Pass is about 40 miles.

Bellaire, Zanesville & Cincinnati.—This company is building ten new bridges.

Birmingham, Selma & New Orleans.—An extension is to be at once surveyed from Martin's Station, Ala., the present terminus, to the Mississippi state line.

Boston & Maine.—The management claim that Governor Sawyer's veto of the Hazen bill was not constitutional, because it did not state his objections to the bill itself, as the constitution provides, and that the five days having elapsed without his signing the bill or vetoing it, constitutionally it has become a law. They say they shall test the question in court as soon as possible.

The Railroad Committee of the New Hampshire Legislature reported favorably last week on the bills ratifying the lease of the Manchester & Lawrence to this company, and the extension of the Dover & Winnipiscogee, and authorizing the Boston & Maine to guarantee and assume the covenants in the lease of the Northern road.

Boston & Providence.—The rumors concerning the lease of this road continue but are denied as fast as published. The New York, New Haven & Hartford, the New York, Providence & Boston and the Old Colony have been named as probable lessees. President Whitney, of the Boston & Providence, and a committee of stockholders addressed a letter last week to the stockholders of the company, stating that such offers had been made for the lease of the road as to make it appear that a favorable contract could be made with some of the corporations desiring to obtain control if the stockholders are disposed to enter into such a contract. The holders of about 10,000 shares of the stock have already assented to a plan of this kind, and should authority be received from the majority of the stockholders, negotiations will be proceeded with at once. Some party seems to have offered to lease the road at an annual rental of 10 per cent. on the capital stock, and to give a bonus of $1,000,000 in addition.

Central of Georgia.—The company has made a proposition to give the East Tennessee, Virginia & Georgia control of the Port Royal & Western Carolina road in exchange for the Brunswick division of the former system. The Richmond & Danville has made a proposition for the Port Royal & Western Carolina, with which it comes into competition, but the Georgia Central prefers to let the East Tennessee, Virginia & Georgia have it.

Central Massachusetts.—The track is laid to the Connecticut River.

Central Vermont.—The recent report of the company shows that all debts against the property, which has been in the hands of receivers and trustees for 29 years, have been canceled. There is no certainty as to the expenditures growing out of the Hartford disaster because of pending suits, as the directors say the Central Vermont does not admit of any liability on account of the accident.

Charleston, Cincinnati & Chicago.—It is stated that this company will lay out a town at the point where its road will cross the Clinch Valley in West Virginia.

Chattanooga, Rome & Columbus.—The company has decided to locate its road through Tallapoosa, Ga., and the engineers are now at work on the survey.

Chicago, Burlington & Northern.—The Supreme Court of Illinois has granted the application of the company for a stay order pending the rehearing of its right of way case with the Illinois Central, concerning 12 miles of track between Galena, Ill., and Dubuque, Ia. The case will now come up at the March term of the court.

Chicago & Indiana Coal.—A branch will be built connecting the main line at Fair Oaks with the Chicago & Eastern Illinois division at Momence, Ind.

Chicago, Kansas & Nebraska.—M. H. King, of Topeka, Kan., has the contract for tracklaying on the Clay Centre branch for 10 miles, and also the contract for a good part of the work in Riley and Clay counties. The road is now completed to Wellsford, Kan., 340 miles from St. Joseph. On the Clay Centre branch track is laid to Grant. The Salina branch is completed to Enterprise. On the Denver extension track has reached Munkato, 45 miles from Fairbury Junction. This makes a total mileage in Kansas of 723 miles.

It is stated that the company will build from Wellington, Kan., through No Man's Land and the Panhandle of Texas to Tascosa, where a branch line will go to Trinidad, the main line continuing on from Tascosa through the corn fields of White Oak to El Paso, Tex. The survey from Tascosa to El Paso is made.

Chicago, Rock Island & Pacific.—The Supreme Court of Iowa has affirmed the decision of the lower court in the Milwaukee Malt Extract Co. against this company. The plaintiff sued to compel the railroad company to transport new beer in this state; the company refused to do so on the ground that it was intoxicating liquor. The Court sustains the road.

Chicago, Santa Fe & California.—The work on this road is now going forward with remarkable rapidity, fully 90 per cent. of the grading being finished, and tracklaying progressing at the rate of 4 miles a day. There have been 144 miles of track put down, 68 on the Missouri division and 76 on the Iowa division.

Chicago Transfer.—Incorporated in Illinois. The intention is to build a road from Proviso, Cook County, south to connect with the Chicago, Rock Island & Pacific at Orland, Cook County.

Cincinnati, Hamilton & Dayton.—Judge Vanderveer on Oct. 26 granted the injunction restraining the directors from purchasing the claims of Henry S. Ives, and has appointed James E. Campbell, of Hamilton, O., Receiver.

The appointment of a Receiver was made on 18 findings of facts; among them that the assets of the company were about $8,500,000; liabilities, $17,000,000; with guaranteed bonds and stocks amounting to over $13,000,000; that the company is insolvent, with no money to meet the present accrued indebtedness; that $4,700,000 preferred stock had been hypothecated by Ives & Co. for their own uses; that William Ramsey and Julius Dexter have paid out large sums without consideration to the company and without authority; that a syndicate has been formed to purchase the claims of Ives & Co. not in the interest of the road; that the manner of the purchase of the Terre Haute & Indianapolis, and the power vested in Ives by the directors show them guilty of gross neglect, whereby the company lost $2,000,000, and they should be held responsible; that the placing of money and securities into the hands of Ives & Co. by the directors was illegal and the directors liable; that the directors have no right to use the company's assets to pay notes given by Ramsey and Dexter, and has no right to form or enter into a syndicate to purchase common or preferred stock, and that great and irreparable injury will result unless the directors are restrained from such acts.

The appointment was immediately annulled by Judge Cox, of the Circuit Court at Glendale, 15 miles north of Cincinnati. The defendants gave a bond of $5,000. The case was brought up again before the three judges of the Ohio Circuit Court on Oct. 27. It will be tried over again, from beginning to end.

Cincinnati Southern.—This company and the Chattanooga, Rome & Columbus will build a depot at Chattanooga, Tenn. Work begins on Nov. 10. The material has been ordered.

Dallas, Archer & Pacific.—It is stated that the company will build to Grapevine, Tex., where connection will be made with the St Louis, Arkansas & Texas, with which road a running arrangement to Fort Worth has been made.

Denver, Memphis & Atlantic.—The Missouri Pacific now operates the road as far west as Horace, Kan., about 473 miles from Kansas City. The line is actually completed to Galatea, 67 miles beyond Horace, but this part is still operated by the contractors.

Denver & Rio Grande.—Messrs. Orman & Crook have begun work at Dallas on their grading contract for the Ouray branch of this road. About 700 men will be employed on the work, and Ouray will be reached in December.

Denver & Santa Fe.—The grading outfits are now being shipped from Littleton, Col., to New Mexico, to be used on the work there and other Southern points.

Duluth, South Shore & Atlantic.—It is stated that owing to the delays in getting rails that the road will not reach its Northern Pacific connections and get into Duluth this fall, and probably not before next July.

East & West of Alabama.—The bondholders have selected E. F. Browning, J. H. Browning, A. Prentice, T. S. Watson, J. S. Silver, R. W. Webb, and F. C. Hollins to investigate the affairs of the company.

Fitchburg.—A Troy dispatch states that there is a report to the effect that this company intends building two iron propeller steamers and establish a new river route from Troy to New York. In purchasing the Troy & Boston the Fitchburg came into control of a track leading to the river front in Troy, and will, it is said, build passenger and freight houses on the wharf.

It is rumored that the company is about to purchase the Adirondack Railway, which runs from Saratoga to North Creek, N. Y., 53 miles. The company will, if it buys this road, survey an extension to Paul Smith's, which is due north 50 miles.

Fort Worth & Denver City.—The Panhandle Construction Co. is pushing the work on this road, and has the track laid 389 miles from Fort Worth. It is expected to have the line built to New Mexico by Jan. 1.

Fresno, Belmont & Yosemite.—This California company will perfect its organization in a few days and proceed at once with the building of the road.

Georgia, Carolina & Northern.—Tracklaying is to begin at once on the Carolina division, and about 50 miles will be laid this fall.

International.—Quicker mail service is promised between this country and Mexico through the near completion of the (Huntington) International Railroad from Piedras Negras to Villa Lerdo, where it connects with the Mexican Central. It is hoped to get mails through from New York city to Mexico in five days, which will be a saving of three days.

Kansas City, Fort Scott & Gulf.—In the suit brought by Barton County, Kan., against this company for not complying with the statutes requiring a railroad to build a depot at its intersection with another road, the court has granted a $30,000 claim made by the county. The statute imposes a fine of $25 a day. The railroad company contended that the statute was unconstitutional.

Kansas City & Southwestern.—This road, which is the Paola (Kan.) branch of the Missouri Pacific, will be completed and turned over to to the latter company by Nov. 15. Eleven miles of track remain to be laid.

Kansas Midland.—Tracklaying has begun at the end of the track near Valley Centre, Kan. The contract for 90 miles north of that point, extending to Ellsworth, has been let to Bracey Bros. A force of 350 men will be put at work.

Kansas Pacific.—The suit of some of the Dutch holders of consolidated mortgage bonds of this road against Jay Gould and Russell Sage to recover their proportion of the value of $3,000,000 of Denver Pacific stock, which they allege was appropriated by Gould and Sage, as trustees, has been discontinued.

Knoxville Belt.—The survey of this Tennessee road has been finished. When the profile and estimates are completed it is understood that the contract for the entire line will be let.

Lake Erie & Western.—It is announced that President C. R. Cummings has sold his interest in this company, in the Duluth, South Shore & Atlantic and in other railroads, and also his interest in the aqueduct contracts controlled by Brown, Howard & Co. The purchasers are a syndicate composed of General Samuel Thomas, Calvin S Brice, and Walston H. Brown & Brothers.

This company and the Chicago, St. Louis & Pittsburgh are again at war in Kokomo, Ind., over the side track to the glass works there. One day this week a force of Lake Erie men tore up the other company's track lying over ground claimed by the former, put down new track and placed 20 cars on it.

Lake Shore & Michigan Southern.—The company is surveying a line from South Bend to Baileytown, Ind., passing through the southern part of La Porte.

Los Angeles County.—Work has begun on this road between Los Angeles and Monrovia, Cal. Three miles are graded.

Louisville Southern.—Grading is in progress on this road. As soon as the trestlework is completed the road will be finished from Shelbyville, Ky., to the Anderson County line on the east, and to Fisherville in the western part of this county.

Manhattan.—Corporation Counsel O'Brien has sent to the Board of Aldermen of New York a reply to the resolution asking him to report if the construction of a third or centre track and the storage there on of long lines of cars is in accordance with the grants given the elevated railroad companies. The reply states that the third tracks have been built without authority and that they form an unlawful obstruction wherever they have been erected.

Maricopa & Phœnix.—C. S. Masters, Manager, has received orders looking to the immediate extension of the road to Globe, A. T. It will be built to that point within the next six months.

Mexican Central.—The gross earnings of this company for the month of September show an increase this year over last of $62,805, or 20.8 per cent. The net earnings show an increase of $30,017, or 27.1 per cent. The statement for the month and for the nine months to Sept. 30 is as follows:

	September.		Nine months.	
	1887.	1886	1887.	1886.
Gross earnings	$363,681	$300,876	$3,429 955	$2,690,771
Operating expenses.	223,250	190,462	1,937,953	1,846 634
Net earnings	$140,431	$110,414	$1,492,002	$844,137

The increase in gross earnings for the nine months was $739,184, or 27.4, per cent. and in net earnings the increase was $647,865, or 76.7 per cent.

Mexican Interoceanic.—It is stated that $5,000,000 is to be had in Europe to complete this road from Acapulco to Vera Cruz, on condition of the subvention being made payable from custom-house receipts at the rate of 2 per cent. per annum.

Milwaukee & Northern.—The road has been extended to Republic, Mich., where connection is made with the Duluth, South Shore & Atlantic.

Minnesota & Northwestern.—The contractors report completion of 1,400 ft. of the tunnel on this road in the town of Rice, Jo Daviess County, Ill. The tunnel is expected to be finished by next January.

Mobile & Birmingham.—About 50 miles of the 80 between Marion Junction, Ala., and the crossing of the Tombigbee River have been completed. Trains will be run over the completed section at once, crossing the river by transfer boat until the bridge is finished.

Montgomery, Hayneville & Camden.—C. P. Rogers, of Letohatchie, Ala., has contracted to survey this proposed road between Montgomery and Camden, Ala.

Nevada County Land & Improvement Co.—This company has been granted a franchise for an electric railroad from Nevada City to Grass Valley, Cal.

New River & Chambers.—Carroll County, Virginia, has voted a subscription of $100,000 to this enterprise.

New York, New Haven & Hartford.—The Connecticut Railroad Commissioners have issued a statement of the cost of the alteration in the crossings of railroads and highways ordered since June 1, 1887. Twenty-two crossings in 11 towns have been ordered above or below grade at an expense of $108,330, of which the towns are apportioned $20,600 and the railroads $87,730. All save two of the crossings are upon the Shore line division of the New York, New Haven & Hartford. The cost of the Norwalk crossing, which has been a pretext for much of the talk about new legislation, is only $1,600 to the town.

Northern Pacific.—It is stated that the terms of the arrangement made between this company and the Union Pacific for the operation of the Oregon Railway & Navigation Co.'s lines are as follows: The latter company's lines will be divided at Snake River Junction; the Northern Pacific leases and operates all east of that point, including the Palouse branch; the Union Pacific operates all west of Snake River; the Northern Pacific's business to Portland is to be prorated on a mileage basis for that portion between Snake River and Portland. A settlement is to be arranged between the Northern Pacific and the Oregon Transcontinental, by which the latter withdraws the claim for $300,000 against the Northern Pacific, and the Northern Pacific withdraws counter-claims against the Oregon Transcontinental.

Ogdensburg & Lake Champlain.—The New York State Court of Appeals has reversed the decision of the lower Court in the Lamoille Valley Extension bond case, and has declared that the guarantee of the bonds of the latter road, issued to Messrs. Vanderbilt and Depew as trustees, must be met, and that the claim, therefor is prior to Ogdensburg & Lake Champlain income bonds. These bonds amount to $350,000. This suit now is of interest only to the immediate parties as a financial question, the Lamoille Valley road, which was intended as a connection between the Ogdensburg & Lake Champlain and the St. Johnsbury & Lake Champlain, having been abandoned after the latter passed to the control of the Boston & Lowell.

Ore Belt.—The bill introduced in the Georgia legislature to incorporate this company has become a law.

Oregon Railway & Navigation Co.—The company has filed supplemental articles of incorporation for the purpose of building numerous branches in Eastern Oregon, Washington Territory and Southern Idaho. Work will probably begin on two branch lines this month.

Oregon Transcontinental.—The directors have ordered the withdrawal of all the suits against the Northern Pacific, including the one for an injunction against the building of the Palouse branch.

Oregon & Washington.—The company has executed a mortgage to the Farmers' Loan & Trust Co., of New York, for $20,000 a mile for 53 miles of road—$1,060,000.

Pacific.—The Pacific Railway Commission held its final session in New York on Oct. 25. It was devoted to the testimony of Effingham H. Nichols, the promoter of the Central Branch, Union Pacific. The Commission will now devote itself to making up its report.

Paducah & Mount Vernon.—The line has been surveyed and contracts are being let for its construction. The road will connect the Ohio & Mississippi, the Louisville & Nashville and the Cairo Short Line, and will develop the coal mines in Gallatin County and the iron mines in Hardin County, Ill., some 10,000 acres. E. A. Quintard, of the Quintard Iron Co., New York, is President.

Paintsville & Licking Valley.—This company has been organized in Kentucky. The proposed road will extend from Paintsville, Johnson County, to Salyersville, Magoffin County, 18 miles.

Pennsylvania.—It is stated that the company has decided to exercise its option to purchase the stock and bonds of the Pemberton & Hightstown road at par. This road extends from Pemberton to Hightstown, N. J., 25 miles.

Philadelphia & Reading.—The real estate assessors of Philadelphia have just reported that the total assessed valuation of the real estate owned by this company in that city is $4,612,505. Through its leased lines it controls property assessed at $1,075 100. Some of this property, as the coal and shipping wharves at Port Richmond, assessed at $1,505,000, could not be duplicated at any price. A Philadelphia paper estimates the true value of the landed possessions of the Reading in that city at $10,000,000.

Port Arthur, Duluth & Western.—Grant & Ro s are progressing with their work on this Canadian road. Their contract is for 80 miles from Port Arthur, which will bring the line within 20 miles of the United States boundary. When completed it is probable that a connecting link may be built to the Duluth & Iron Range road, which is building north to the boundary.

Poughkeepsie, Hartford & New England.—A meeting will be held, on Nov. 14, in Poughkeepsie by the stockholders of the Poughkeepsie & Southwestern to consider the proposition of the consolidation with the above company under the name of the Pennsylvania, Poughkeepsie & Boston, in accordance with the terms of agreement made by the respective boards of directors of the two companies. The Poughkeepsie & Southwestern was organized in 1883 by persons interested in the old Pennsylvania, Slatington & New England. The line of road, as proposed, extends from a point at the Poughkeepsie bridge through the Wallkill Valley to a point on the New York and New Jersey state line near the Wallkill River. Nothing was ever done except to make a preliminary survey and to organize by electing directors.

Red River Valley.—A dispatch from Winnipeg, Man., states that Premier Norquay has concluded arrangements with Mann & Holt, contractors, whereby the road is to be built. Holt, it is said, has succeeded in forming a syndicate of ten, who take $25,000 of Provincial bonds each. These bonds are to be indorsed by the contractors. It is also stated that Winnipeg will give the government $300,000 to assist in carrying out the enterprise.

Richmond & Danville.—The Piedmont Exposition is held on the fair grounds adjacent to this road, some four miles out of Atlanta, Ga., and the road is carrying large numbers of people to and from the city. Extra passenger cars have been hired from the New York & Sea Beach road (which is not crowded with passengers just now), and the heavy trains are drawn by consolidation engines. Special telegraph offices and wires have been erected and trains are run on the absolute block system.

Roanoke & Tar River.—The extension from Baykins, Va., to Beverly, N. C., 31 miles, has been completed and put in operation.

Rockland Limerock.—This company has organized to build a road around the city of Rockland, Me., connecting the various limestone quarries and kilns with the Knox & Lincoln road. There are 1,500,000 casks of limestone transported each year. A permanent survey of the road is now being made.

Rocky Fork & Cooke City.—This road, which will tap the important coal mines at Red Lodge, Mont., is now under way. It will supply the Northern Pacific, the whole of Western Dakota and the Yellowstone Valley, in Montana, with fuel. The grading is being done very fast. Comings & Co., the contractors, expect to have the 45 miles graded by Dec. 1.

St. Louis, Arkansas & Texas.—The stockholders have voted on and carried the proposition to extend the 6 per cent. first mortgage of $13,000 per mile now on the road, over all branches built or acquired. There have been 120 miles of branches constructed.

Tracklaying on the extension of this road from Corsicana to Hillsboro, Tex., is laid to within 16 miles of Hillsboro.

St. Louis, Iron Mountain & Southern.—The final survey of the Arkadelphia & Fort Smith branch is now in progress.

St. Louis & San Francisco.—The survey is being made from a point 70 miles west of Mobeetie, Tex., on the Paloduro River, to Mobeetie. The line is also being permanently located between Fort Reno and Mobeetie.

St. Paul & Duluth.—It is stated that the company wil begin at once its extension from St. Paul to Omaha, the survey being about completed.

St. Paul, Minneapolis & Manitoba.—The extension of the Park River Branch from Park River to Langdon, D. T., has been completed. The distance is 40 miles.

Salt Lake & Los Angeles.—Surveyors are now locating lines from Los Angeles, Cal. to Sansal Redondo and Rattlesnake Island.

San Francisco & San Joaquin Valley.—This company, recently incorporated with the purpose of building from Antioch to Mojave, Cal., has graders at work near Dutch Corners, in Stanislaus County. A gang in the employ of the Southern Pacific is only a short distance away running a parallel line.

Santa Rosa & Carquinez.—Work on this California road progresses without delay. The bridge across Napa Creek is nearly finished and tracklaying goes on at the rate of a mile a day. Trains will be running in a few days between Napa Junction and the Embarcadero, just below Sonoma. By Dec. 1 trains will be running from Santa Rosa to Napa Junction.

Schuylkill Navigation Co.—As a foreclosure of the property has been threatened by the trustees of the Philadelphia & Reading, the President of this company has issued a circular advising the outstanding creditors to deposit their securities under the plan. He states that only $671,801 in securities have been deposited out of a total issue of $12,457,134.

Southern Pacific.—It is probable that the road projected from Winters to Ukiah will be extended to Davisville, Cal.

Squirrel Hill.—A charter has been issued to this company of Allegheny County, Pa.

Texas Roads.—The following railroad companies reported last week to the State Controller of Texas their business for the year ending Sept. 30, in round figures: Texas Central, receipts, $240,000; expenses, $246,000. Houston, East & West Texas, receipts, $331,000; expenses, $209,000. Houston & Texas Central, receipts, $3,024,000; expenses, $1,307,000. Texas & Mexican, receipts, $173,000; expenses, $122,000. Fort Worth & New Orleans, receipts, $72,000; expenses, $31,000. Austin & Northwestern, receipts, $90,000; expenses, $67,000.

Toledo, Peoria & Western.—The attorney of this company states that he has settled with the re atives or legal representat.ves of 40 of the people who were kil led at Chatsworth, and with 60 of those who were injured. The highest amount paid for a death was $2 000.

Tucson, Globe & Northern.—The Tucson & Globe Narrow Gauge Railroad, of Arizona, is to be made standard gauge, and the name changed as above.

Union Pacific.—In connection with the Central Pacific another passenger train will be put on between Omaha and San Francisco beginning Nov. 13. It is stated that the time between Omaha and Ogden will be reduced 12 hours, and from Ogden to San Francisco about 8 hours.

Vancouver, Klickitat & Yakima.—The company has been recently incorporated. A survey has been made from Vancouver, W. T., up Lewis River to the head of the Klickitat.

TRAFFIC AND EARNINGS.

Export Rates.

The Joint Committee of the Trunk Lines and the Central Traffic Association, at a meeting held in New York last week adopted the following tariff from Chicago to European ports:

	Meat.	Lard.	Flour.	Oil cakes.	Grain.	Cheese.	Butter.
Liverpool	40	38	34	33	32	64	79
London	48	45	35	34	35	70	80
Glasgow	51	45½	35	34	38	74	85
Bristol	51	47	37	36	...	...	...
Rotterdam	53	50	39	38	...	...	...
Amsterdam	53	50	39	38	...	.	...
Hamburg	48	46	40	39	...	...	...
Bremen	48	48	40	39	..	...	..
Antwerp	47	47	39	38	...	...	...

These rates are intended to be adhered to as minimum prices, and have yet to be approved by the roads in interest, to whom they have been referred. The rates are to apply via any of the four principal ports, Boston, New York, Philadelphia, Baltimore.

Passenger Rates from Rochester.

The New York State Association of Passenger Agents has decided to allow the Rome, Watertown & Ogdensburg differentials on rates from Rochester and other points to Chicago, on a basis of $8.50 first-class and $7 second-class from Rochester.

Coal.

The coal tonnages for the week ending Oct. 22 are reported as follows:

	1887.	1886.	Inc. or Dec.	P.c.
Anthracite	504,590	398,378	I. 106,212	26.9
Bituminous	293,715	274,838	I. 18,877	6.8

The Cumberland coal shipments for the week ending Oct 22 amounted to 80,814 tons, and for the year to that date 2,596,181 tons.

The coal tonnage of the Pennsylvania road for the week ending Oct. 22 is reported as follows:

	Coal.	Coke.	Total.
Line of road	204,311	85,123	289,434
Year to date	8,212,114	2,871,123	11,083,237
To Oct. 22, 1886	6,802,069	2,806,913	9,668,982

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1887.	1886.	Inc. or Dec.	P.c.
Month of September:				
Coeur d'Alene	$16,168	.....	.....	....
Net	7,847	.....	.....	....
Chi., St. L. & P.	518,486	$463,505	I. $54,981	11 8
Net	157,445	133,247	I. 24,198	18.1
Ft. W. & Den. C.	59,255	42 259	I. 16,996	40.1
Net	28,258	23,354	I. 4,904	20.9
Mexican Cen.	363 681	300,876	I. 62,805	20.8
Net	140,431	110,514	I. 30,017	27.1
Nash., C. & St. L.	270,148	223,312	I. 46,736	20.9
Net	121,404	86,840	I. 34,564	39.8
Northern Pacific.	1,408,000	1,372,672	I. 35,328	2.5
Net	694,000	769,031	D. 75,031	9.7
Pennsylvania:				
E. of Pittsburgh.	5,006,568	4,674,052	I. 332,516	8.1
Net	1,758,195	1,816,535	D. 58,340	3.2
Beech Creek	62,717	53,977	I. 8,740	16.1
Chic. & N. W.	2,853,941	2,746,150	I. 107,490	3.9
Month of August:				
Carolina Central.	$36,020	$32,329	I. $3,691	11.4
Chas. & Sav.	30,327	30,924	D. 597	1.9
Colum. & Rome.	3,185	5,039	D. 1,854	37.0
Gr. B., N. & St. P.	42,073	25,206	I. 16,867	66.7
Jack., T. & K. W.	22,569	18,850	I. 3,719	19.6
Kentucky Cent.	108,069	92,580	I. 15,489	16.7
N. Y., P. & Nor.	40,267	32,380	I. 7,898	24.3
Northe'rn (S. C.).	32,373	29,785	I. 2,588	8.6
Northern Central.	668,628	502,027	I. 166,601	21.2
Omaha & St. L.	33,872	32,071	I. 1,801	5.6
Petersburg.	27,589	25,837	I. 1,752	6.7
P. Royal & Aug.	15,994	21,408	D. 5,414	25.2
Pres. & Ariz. Cen.	8,337	.....	.....	...
Rich. & Peter'b.	19,131	17,337	I. 1,794	10.3
Seab'rd & Roan.	44,599	34,209	I. 10,390	30.3
South Carolina.	86,726	76,525	I. 10,201	13.3
Union Pacific.	2,536,599	2,587,731	D. 51,132	1.9
Total	$3,688,021	$3,564,227	I. $182,755	....
			D. $58,961	..
Net			I. 123,794	3.4
Eight months—Jan. 1 to August 31:				
Bruns. & West	$223,423	.....	.....	.
Charles. & Sav.	323,503	$312,628	I. $10,875	3 4
Col. & Rome.	86,709	39,594	D. 2,825	7.1
Gr. B., W. & St. P.	311,871	206,296	I. 105,575	51.1
Jack., T. & K. W.	311,482	160,673	I. 150,809	93.8
Kentucky Cent.	672,378	577,985	I. 94,393	16.3
N. Y., P. & Nor.	346,033	281,365	I. 64,668	22.9
Northe'rn (S. C.).	345,196	346,650	D. 1,454	4.1
Northern Central.	4,226,557	3,533,889	I. 692,668	19.6
Petersburg.	237,199	245,057	D. 7,858	3.2
P. Royal & Aug.	202,428	195,450	I. 6,978	3 5
Rich. & Peters.	152,221	138,912	I. 13,309	9.5
South Carolina.	694,181	672,315	I. 21,866	3.2
Union Pacific.	18,037,863	16,312,266	I. 1,725,597	10.5
Total	$25,897,681	$23,023,082	I. $2,886,736	...
			D. 12,137	...
Net			I. 2,874,599	12.4
Nine months—Jan. 1 to Sept. 30:				
Bur., C. R. & No.	$2,081,105	$2,019,656	I. $61,449	3.0
Cape F. & Y. V.	193,187	160,244	I. 32,943	20.5
Central of Iowa.	950,999	939,678	I. 11,321	1.2
Ches. & Ohio	3,281,077	3,025,285	I. 255,792	8.4
Ches., O. & S. W.	1,366,362	1,186,030	I. 180,332	15.2
Cin., J. & Mack.	347,741	299,219	I. 48,522	16.2
Cleve., Ak. & C.	417,850	404,963	I. 12,887	3.1
Cleve. & Marietta	221,861	204,761	I. 17,100	8.3
Col. & Cin. Mid.	240,678	232,833	I. 7,845	3.3
Den. & R. G. W.	820,800	747,263	I. 73,537	9.8
Det., B. C. & Al.	365,864	160,666	I. 205,198	127.0
Det., M. & Marq.	271,385	196,679	I. 74,706	37.9
E. Ten., Va. & G.	3,718,692	2,981,603	I. 737,089	24.7
Ev. & Indianapolis	176,535	141,408	I. 35,127	24.8
Ev. & Terre H.	633,372	575,267	I. 58,105	10.0
Flint & P. M.	1,922,702	1,602,994	I. 319,708	19.9
Fla. Ry. & N. Co.	746,161	673,983	I. 72,178	10.7
Georgia Pacific.	855,325	563,575	I. 291,750	51.7
Grand Trunk	13,389,615	12,436,294	I. 963,321	7.7
Gulf, Col. & S. F.	1,806,010	1,497,523	I. 308,487	20.5
Ind., Bloom. & W.	1,937,530	1,860,122	I. 77,408	4.1
Ind., Dec. & Spr.	309,278	305,137	I. 4,141	1.3
K. C., Ft. S. & G.	1,977,235	1,788,504	I. 188,731	10.5
K. C., Sp. & Mem.	1,495,496	1,074,415	I. 421,081	39.1
K. C., Cl. & Spr.	187,806	168,909	I. 18,897	11.1
Keok. & West	231,038	220,389	I. 10,649	4.6
Lake Erie & W.	1,505,980	1,276,275	I. 229,705	17.9
Lehigh & H. R.	183,197	157,300	I. 25,897	16.4
L. Rk. & M.	562,010	483,391	I. 78 619	16 2
Lou., Ev. & St. L.	727,042	616,376	I. 110,666	17.9
Louis., N. A. & C.	1,658,959	1,345,924	I. 313,035	23.2
L., N. O. & Tex.	1,351,501	1,087,201	I. 264,300	24.3
Ma'q., H. & O.	827,106	774,189	I. 52,917	6.8
Minn. & N. W.	967,261	323,540	I. 643,721	198.9
Miss. & Tenn.	310,178	262,388	I. 47,790	18.2
Ohio Southern.	411,489	360,943	I. 50,546	14.0
Peoria, Dec. & E.	634,514	591,969	I. 42,545	7.6
Pitts. & West	1,458,571	1,125,303	I. 333,268	29.6
Shenandoah Val.	648,473	533,331	I. 115,142	21.5
Texas & Pacific.	4,006,666	3,968,229	I. 38,437	.9
Tol., P. & West.	976,864	639,606	I. 337,258	52.7
Valley (Ohio)	475,640	431,081	I. 44,559	10.3
Wisconsin Cen.	1,550,70)	1,106,447	I. 424,253	38.3
M., St. C. & W.	370,905	198,567	I. 172,338	86 6
Wis. & Minn.	219,048	136,374	I. 82,674	61.3
Total	$58,781,808	$50,885,834	I. $7,895,974	15.5

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Cotton.

The cotton movement for the week ending Oct. 21 is reported as below, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	190,697	178,757	I. 11,940	6.6
Shipments	140,577	137,088	I. 3,489	2.5
Stock	229,700	185,521	I. 44,179	23.8
Seaports:				
Receipts	271,799	266,818	I. 4,981	1.8
Exports	176,848	147,722	I. 29,126	12.9
Stock	580,945	553,322	I. 27,623	4.9

The Inter-state Commission.

On Oct. 21 the Commission called up the case against the Oregon Railway & Navigation Co., in which complaint was made of high charges on freight from local points in Washington Territory to Portland. The complainants, however, did not appear, and the case was dismissed without prejudice.

A complaint was received from the Allegheny Coal Producers' Association, of Rimer, Pa., against the Allegheny Valley road, alleging that the rate on coal from that point to Buffalo had been unjustly increased from 85 cents to $1.10 per ton.

A decision has been rendered in the case of Messrs. Keith & Wilson against the Kentucky Central, the Louisville & Nashville and the Pittsburgh, Cincinnati & St. Louis roads. This was a complaint against the roads for discrimination in the matter of terminal facilities for live stock, the complainant having a pen adjoining the railroad tracks, but being compelled to use the pens of the Covington Stock Yards Co., with which the roads have made an exclusive contract for fifteen years, from 1881. The rival pens are situated on the same side track.

The decision holds that "it is the duty of the defendants to

provide reasonable and proper facilities for receiving and discharging live stock free of charges other than the usual transportation charges. This duty is not fully discharged by receiving and discharging stock at a depot, access to which must be purchased; the complainants are entitled to ship and receive live stock free from any other than the customary transportation charges." In view of the fact that the general freight depot is unsuited for use as a live stock depot, until the defendants provide some other suitable and convenient place the defendants will be required to receive and deliver at complainants' yards. As the same question is involved in a suit now pending in the United States courts, the Commission gives leave to both parties to apply for a modification of this order after a determination shall have been reached in the courts.

George Rice, of Marietta, O., has filed three additional complaints against the Standard Oil Co.

It will be remembered that the Boston Chamber of Commerce entered a protest against the practice of the railroads of giving a rebate on grain shipped to Boston for export, the result of which is to make the rate on grain shipped to Boston for home consumption 5 cents higher than that on grain exported. The Commission has now received a memorial signed in behalf of fourteen commercial associations of Boston, in which the other side of the question is emphasized. This communication represents that, if the roads are compelled to advance their rates on export freight it will injure Boston's export business. The parties believe that a difference should be allowed, but that it should be much less than five cents per 100 lbs.

Leading Boston exporters and steamship agents have also forwarded to the Commission a memorial protesting against any increase in the rates on export freight.

The Commission has sent to the railroads a circular requesting them to send in statements showing where and to what extent they are making through passenger or freight rates which would be prohibited by a strict construction of the fourth section. The circular says that the Commission could, of course, compile this information from the tariffs on file in the office, but that the labor involved in such an undertaking is so great that the Commission asks the roads to furnish it as a favor which will greatly facilitate the work of the board.

At the request of the complainants, the cases of F. B. Thurber, representing the Board of Trade and Transportation of New York; Thomas L. Greene, Manager Merchants' Freight Bureau, and Francis H. Leggett & Co., against the Trunk lines, being the "carload rate cases," which were assigned to be heard Nov. 1, have been postponed to Dec. 13.

On Oct. 25 counsel for the Adams, American, National, Wells-Fargo, United States, Southern and Erie Express companies presented their views of the status of express companies under the Inter-state Commerce law.

The Adams referred to the action of the government in the census of 1880 which, it was claimed, was a recognition of the express business by a Federal department as *sui generis*—something entirely apart from that of common carriers. It was argued that there was nothing upon the face of the act to show an intent upon the part of Congress to include express companies. The act arose from a complaint of an unjust discrimination between the shipper and the railway lines sufficiently grave to justify governmental interference. There was no complaint against any express company—no petition that the government should interfere. The intent of the law was to regulate and control the operations of corporations which the government had created, and in no wise to control those who merely used the railroads. No one would ever confound an express package with a freight package. Counsel read from past acts of Congress to show that where telegraph or express companies were intended by Congress to come within the provisions of an act such companies were explicitly referred to. In one of these acts, referring to companies "who carry money or valuable packages for pay," he claimed that Congress had defined the meaning of the term "express company." Quoting the phrase of the act, "Wholly by rail or partly by rail and partly by water in one continuous line," he declared that there was no express company in the country doing inter-state business which fell under this definition. He quoted from decisions of the Supreme Court to the effect that express companies are not common carriers.

Counsel for the American, National and Wells-Fargo set forth in detail the origin, history and legal status of these companies. He had examined the report of the committee and the testimony taken by it previous to the enactment of the law. Nowhere were express companies named. No express officials were called upon for information. Compliance with the law, he said, in reply to inquiries by Commissioner Walker, would be impossible, because no express company could bear the enormous clerical expense. There would be no other objection, so far as he could see, to compliance with the law. He declared on behalf of his clients that they were not here to resist the operations of the law, but to consult with the Commission with regard to its interpretation.

Counsel for the Southern Express said that according to his reading of the law, to make the common carrier subject to the provisions of the Inter state act it must own or operate a railroad.

Nebraska Rates.

It is reported that roads taking freight between Chicago and Nebraska points have agreed to reduce local rates materially, in accordance with the recent demand of representatives of the local trade in Lincoln, Neb., and that they have also made some reductions on coal, lumber and other staples from Chicago to principal points in Nebraska.

Discrimination in Illinois.

The Joliet, Aurora & Northern has complained to the Illinois State Railroad and Warehouse Commissioners that the Chicago, Rock Island & Pacific, at Joliet, charges $5 per car for switching service which, before the opening of the former road, was done for $1.50 per car, and that the last named rate is still maintained on business for customers who do not use the Joliet, Aurora & Northern.

The Fourth Section.

The Wisconsin Central, whose line from St. Paul, Minn., to Ashland, Wis., is 291 miles long, is accused of taking freight between those cities at some 40 per cent. less than tariff rates (and less than is charged to intermediate points), for the purpose of competing with the Chicago, St. Paul, Minneapolis & Omaha, whose line between the same cities is only 184 miles in length.

ANNUAL REPORTS.

Louisville & Nashville.

The report of this company for the fiscal year ending June 30, 1887, gives the total length of road operated as 2,023 miles, as follows: Owned, 1,612 miles; operated under lease, 142 miles; operated for account of South & North Alabama, 189 miles; operated under lease for account of the various companies, 79 miles. The total mileage of roads owned, leased, and in which the company owns the majority of the stock is 3,707 miles.

The equipment consisted of 11,271 cars of all kinds and 391 locomotives, being a net increase of 774 cars. The payments for excess mileage made by foreign cars during the year was $169,653, and it was deemed wise to order more rolling stock. Accordingly 15 consolidation locomotives and 1,600 freight cars have been contracted for.

The general account condensed is as follows:

Cost of road and branches	$68,936,039.87
Bonds owned	6,262,598.51
Stocks owned	1,708,983.81
Stocks and bonds held in trust	9,527,877.74
Construction of new lines (being total cost to date)	1,774,491.82
Advances (being balance of account to date)	1,267,024.23
Material, rails, ties and fuel	1,044,803.14
Real estate, quarry and timber lands	434,816.05
Sundry assets	2,702,249.00
Cash	1,375,140.59
	$95,034,024.63
Capital stock	30,000,000.00
Mortgage debt	61,329,660.00
Car trusts	669,336.50
Sundry liabilities	2,498,516.81
Profit and loss	535,911.32
	$95,034,024.63

The increase in bonded debt is $644,342.

The earnings for the year were as follows:

	1886-7.	1885-6.	Inc or Dec.	P. c.
Freight	$10,254,483	$8,655,861	I. $1,598,622	18.4
Passenger	3,859,525	3,494,832	I. 364,693	10.4
Mail, express, miscellaneous	966,577	1,026,325	D. 59,749	5.8
Total	$15,080,585	$13,177,018	I. $1,903,566	14.4
Operating exps.	9,047,054	8,213,295	I. 833,759	10.1
Net earnings	6,033,531	4,963,723	I. 1,069,808	21.5
Gross earn. per m.	7,455	6,514	I. 941	14.4
Net " " "	2,983	2,454	I. 529	21.1
Per cent. of exps.	59.9	61.3	D. 1.4	....

The income account is as follows:

RECEIPTS.

Gross earnings, year 1886-87	$15,080,585	
Income from investments	479,858	
		$15,560,443
Bonds issued		1,302,750
Bonds sold		1,027,168
Stock sold		225,450
South & North Alabama Railroad Co		1,893,291
Unpaid on roll's and vouchers		138,120
Real estate		163,929
Interest		3,400
Bills payable		396,566
Sundry railroads and persons		316,036
		$20,967,756

PAYMENTS.

Cost of road, construction, etc		$502,048
Operating expenses, year 1886-87	$9,047,053	
Interest and rents	4,315,820	
Taxes	365,317	
		13,728,190
Bonds bought		2,858,832
Bonds redeemed		906,658
Stock purchased		40,060
Floating debt		110,189
Advances		1,426,490
Bills receivable		123,203
Auditor of receipts		67,366
Material		118,542
Profit and loss		17,074
Cash, increase		1,071,165
		$20,967,756

The growth of traffic is shown by the following table:

Years.	Miles operated, average.	Gross earnings.	Earnings per mile.
1878-79	972	$5,387,596	$5,543
1879-80	1,310	7,435,843	5,676
1880-81	1,840	10,911,651	5,930
1881-82	1,971	11,987,745	6,082
1882-83	2,032	13,234,916	6,513
1883-84	2,065	14,351,091	6,950
1884-85	2,057	13,936,346	6,775
1885-86	2,023	13,177,019	6,514
1886-87	2,025	15,080,585	7,455

There were 78 miles of steel rail laid during the year, making for the Louisville & Nasbville system and leased lines 1,715 miles of steel and 308 miles of iron in the track.

Some extracts from the comments of President Norton follow:

"It having been demonstrated to be economy to use much heavier and more powerful locomotives and cars of increased tonnage, all the freight locomotives that have been bought by your company or built in the shops for the past few years have been of the new consolidation pattern, weighing from 110,000 to 116,000 lbs., and the cars constructed so as to carry 20 to 30 tons each. The bridges on your railroad were designed to carry much lighter loads, and, in consequence of these heavy engines and trains, it has been found necessary to reconstruct the bridges. This work is being done systematically, and during the past year your company expended $66,350 for this purpose, over and above the value of the old structures, and this policy will be continued until all the bridges on the entire line are strong enough to bear the increased loads. * * * The expenditures during the fiscal year just closed for lengthening and building new side tracks amounted to $66,949, and $129,759 was spent for ballast. * * * The work of construction is rapidly progressing on the Birmingham Mineral Railroad, the Nashville, Florence & Sheffield, the Cumberland Valley Branch, as far as Pineville (and the extension east of Pineville to a connection with the Norfolk & Western Railroad should be continued as rapidly as practicable), the Bardstown Branch Extension, and the Princeton Branch. In the territory tributary to the lines of your company and those of the Nashville, Chattanooga & St. Louis there are, at the date of this report, 21 coke furnaces and 11 charcoal furnaces, in operation, and 22 coke furnaces and 6 charcoal furnaces in course of construction, and it is expected that a majority of these furnaces will be in blast by Jan. 1, 1888. The average output of pig-iron per day, of each of the coke furnaces, is fully 115 tons, and of the charcoal furnaces about 50 tons each, and when it is taken into consideration that it requires over 4 tons of material (viz.: 2 tons of iron ore, 1½ tons of coke, and about half a ton of limestone) to make 1 ton of pig iron, it can readily be seen that there will be a large increased demand on the railroads for transportation.

"The Birmingham Mineral Railroad is owned by your company, and consists of two branches, called respectively North and South branches, which were completed in July, 1884. The total length is 11 miles. It is the intention of your company to extend the South Branch still further along and around the southern base of the Red Mountain, and through Reeder's Gap to the northern side, thus making a belt road around the mountain and connecting with the present terminus of the North Branch. By encircling the Red Mountain in this manner with a railroad on each side, the mining and transportation of the immense deposits of iron ore therein contained will be greatly facilitated and the cost much reduced. From the point of connection with the north and south branches, the Birmingham Mineral Railroad is to be extended through the town of Bessemer, where there are two large coke furnaces nearly completed and one large rolling mill being constructed, and from there to Woodward, where two furnaces are in blast, and from there to Ensley, where the Tennessee Coal, Iron & Railroad Company are building four large furnaces which are nearing completion; from Ensley to the Thomas furnace and from there to the South & North Alabama Railroad, at or near Boyle's Station, thus forming a large belt railroad around the city of Birmingham. A branch will also be extended to the Edwards Furnace at or near Woodstock, Ala., which will open up new and undeveloped coal fields. There are already two furnaces in blast on this branch and eight in course of construction, and it is expected that they will be fully completed and in operation by Jan. 1, 1888. * * * These extensions, now under construction, will be about 54 miles, making the total length 65 miles, and it is expected that they will be completed early in 1888.

"The Nashville & Florence Railroad Co. was consolidated with the Tennessee & Alabama Railroad Co., the new company being called the Nashville, Florence & Sheffield Railway Co. The Nashville & Florence Railroad was a completed road from Columbia, Tenn., to St. Joseph, Tenn., a distance of about 56 miles, and contracts have been made to extend the new line from St. Joseph, Tenn., to Florence and Sheffield, Ala., and also to build a branch to the iron ore beds at or near West Point, Tenn., in all a distance of about 40 miles. The work is all under contract and it is expected that the entire line will be completed by the 1st of May, 1888. The Chief Engineer in 1885 was instructed to make a thorough examination and to report an estimate of the cost of constructing a branch railroad up the Cumberland Valley to Cumberland Gap, and also to report upon the resources of the country, especially coal, iron and timber. He made his report and furnished an estimate of the cost of constructing this branch, standard gauge, from Corbin Station, which is 171 miles south of Louisville, Kentucky, on the Knoxville Branch of the Louisville & Nashville, to Cumberland Gap, a distance of about 50 miles. * * * The right of way has been obtained and contracts have been let to grade and bridge some 31 miles from Corbin Station, and it is expected that the line will be completed to Pineville by Jan. 1, 1888.

"Respecting the extension east of Pineville, a report was made by the Chief Engineer some months ago, but, before locating the line, the Board ordered that other surveys should be made, and the Chief Engineer has some three or four corps of engineers making thorough surveys and examinations of the various routes to extend this line so as to form a connection with the Norfolk & Western Railroad at some point to be agreed upon in Wise County, Virginia. * * *

Work is progressing on the Bardstown extension (20 miles), and it is expected that the line will be completed and opened for business by Jan. 1, 1888. The additional expenses of operating the entire line from Louisville to Springfield, Ky., a distance of 59 miles, will be but small, as the same train service now running from Louisville to Bardstown, a distance of 39 miles, will be extended to Springfield, Ky., as soon as the line is completed to that point. * * *

"The line from Princeton, Ky., is all under contract, and construction is rapidly progressing. The gauge of the road will be changed to 4 ft. 9 in., which is the standard gauge of the Louisville & Nashville Railroad. The line, when completed to Princeton, Ky., will be 56 miles long, and it is expected that it will be opened for business early in 1888.

"Although last year's earnings have been very satisfactory, it was deemed best not to declare any dividend, as the necessity for the extension of branches, and for new equipment to meet the requirements of increased business, made it desirable to keep your company in a strong financial position."

Evansville & Terre Haute.

At the close of the fiscal year ending Aug. 31, 1887, this company operated a line from Evansville to Terre Haute, 109 miles, with a branch from Ft. Branch to Mt Vernon, 37 miles, and the New Pittsburgh branch of 10 miles, a total of 156 miles operated.

The company also owns a line from Terre Haute to Rockville, 23 miles, which it leases to the Terre Haute & Logansport and the Chicago & Eastern Illinois. The construction account was increased during the year $62,070. The gross earnings were the largest the company has ever realized.

The general balance sheet condensed was:

Liabilities:		
Capital stock	$3,000,000	
Funded debt	4,011,000	
Sundry liabilities	324,543	
Balance to income account	829,136	
		$8,164,679
Assets:		
Construction and equipment	$6,666,243	
Material	47,513	
Securities	981,150	
Cash and accounts	212,018	
Branch extension Farmsburgh to New Pittsburgh	117,604	
Evansville & Indianapolis Co	140,151	
		$8,164,679

The gross and net earnings compared with the previous year were as follows:

	1886-7.	1885-6	Inc. or Dec	P. c.
Freight	$404,786	$445,931	I. $48,855	10.9
Passengers	198,701	200,122	D. 1,421	.7
Express	29,256	17,838	I. 11,418	64.1
Mail	16,239	16,399	D. 160	.9
Miscellaneous	92,790	83,868	I. 8,922	10.6
Total	$831,772	$764,158	I. $67,614	8.8
*Operating expenses.	398,216	348,122	I. 50,094	14.4
Net earnings	$433,556	$416,036	I. $17,520	4.7
P. c. op. exp. to earn.	47.8	45.7	I. 2.1	...
Net earn. per mile	2,780	2,649	I. 1.31	....

* Not including taxes.

The expenses were divided as follows:

	1886-7.	1885-6.	Inc. or Dec.	P. c.
Conducting transportation	$128,522	$115,258	I. $13,264	11.5
Motive power	112,247	97,123	I. 15,124	15.5
Maintenance of way	71,716	68,500	I. 3,206	4.6
" " cars	63,999	50,249	I. 13,750	27.3
General expenses	21,742	16,992	I. 4,750	27.9

The income account was as follows:

Balance Sept. 1, 1886		$655,090
Gross earnings		831,772
I. & E. suspense acct		132,780
Premiums on bonds sold		52,388
		$1,672,030
Interest on bonded debt	$213,647	
" floating "	10,094	
" acct of 1886	43,790	
Dividends (4¾ p.c.)	142,500	
Taxes	30,365	
Sundry accts. cancelled	4,280	
Operating expenses	398,216	
Balance	829,136	
		$1,672,030

The engine mileage was 687,569 miles, against 664,219 miles last year. The average cost was 16.28 cents, against 14.62 cents last year.

The average car load was 10.52 tons. Average haul, 79 miles, and earnings per ton-mile were 1.04 cents, against 0.97 cents last year.

The passenger-mile revenue was 2.06 cents, and the average journey 26 miles.